

## SUPPLEMENTAL CHAPTER 4: LIFE-CYCLE COSTS AND PAYBACK PERIODS

The effect of standard levels on individual consumers includes a change in operating expense (usually a decrease) and a change in purchase price (usually an increase). The net effect is analyzed by calculating the life-cycle cost and payback period, using engineering data for energy consumption and equipment price from an earlier *Draft Report* on residential cooking products<sup>1</sup>, and estimating an energy price for the year in which new efficiency standards are assumed to take effect (i.e., the year 2001).

The following tables present the life-cycle costs (LCC) and payback periods (PBP) of design options analyzed for the following classes of residential cooking products: 1) electric non-self cleaning ovens, 2) gas cooktops, 3) gas non-self cleaning ovens, and 4) gas non-self cleaning ranges (i.e., a cooking appliance consisting of a cooktop and a non-self cleaning oven). The earlier *Draft Report* on residential cooking products demonstrated that the first three standard levels for the above classes of cooking products require more in-depth analysis to determine whether they are cost-effective under different circumstances for improving energy efficiency. For electric non-self cleaning electric ovens, the first three standard levels cover the following design options: reduced vent rate, improved insulation, and improved seals. For gas cooking products, standard levels one and two represent the baseline model while standard level three represents the baseline model with either an electric or electronic ignition device.

### 4.1 LIFE-CYCLE COST

The LCC is the sum of the installed consumer cost (*ICC*) and the present value of operating expenses (*OE*) discounted over the lifetime (*N*) of the appliance.

$$LCC = ICC + \sum_{t=1}^N \frac{OE_t}{(1 + r)^t} \quad (4.1)$$

If operating expenses are constant over time, Eq. 4.1 simplifies to:

$$LCC = ICC + PWF \cdot OE, \quad (4.2)$$

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<sup>1</sup> The engineering data used here for the calculation of life-cycle costs and payback periods can be found in an earlier report on kitchen ranges and ovens entitled *Draft Report on Potential Impact of Alternative Efficiency Levels for Residential Cooking Products*, April 1996, prepared by Lawrence Berkeley National Laboratory for the U.S. Department of Energy.

where the present worth factor is defined as:

$$\text{PWF} = \sum_{t=1}^N \frac{1}{(1 + r)^t} = \frac{1}{r} \left[ 1 - \frac{1}{(1 + r)^N} \right] \quad (4.3)$$

The LCC is calculated for each class in the year levels are set, using a discount rate,  $r$ .

The installed consumer cost (ICC) is composed of a retail price—based on factory costs, factory, distributor, and retail markups—plus installation costs (where applicable). For the gas cooking appliances considered here, only a single design option, an electric or electronic ignition device, is assumed to incur an increase in installation cost. In the case of electric non-self cleaning ovens, it is assumed that none of the design options considered cause an increase in the installation cost. A more complete discussion of the impact on installation cost due to electric and electronic ignition devices for gas cooking products will follow.

Operating expenses (OE) include energy expenditures and maintenance costs. Annual energy consumption is the average unit energy consumption in the *field* (from LBNL-REM). Annual energy expense to the consumer is annual energy consumption times energy price. Annual energy consumption values are discussed in detail in Appendix A of the earlier *Draft Report* on residential cooking products. Energy price is the projected average residential energy price for the year 2001 multiplied by an end-use factor of 1.04 for electric and 1.11 for gas, both derived from DOE/EIA's *1990 Residential Energy Consumption Survey*<sup>2</sup>. Annual operating expenses are discounted to the year of purchase (2001) and summed over the average life of the product to obtain a present value. For the residential sector, the discount rate is 6% real, with sensitivity analyses performed at 2% and 15% real.

#### 4.1.1 Installation Costs—Electric and Electronic Ignition Devices

For the gas cooking appliances considered here, all baseline models are assumed to utilize standing pilot ignition devices. Electronic and/or electric ignition devices are a means in which to eliminate the need for standing pilots and reduce overall energy consumption. But for those households which currently use gas cooking appliances with standing pilot ignition devices and do not have electrical wall outlets installed in the kitchen, the purchase of a new gas cooking product with an electric and/or electronic ignition device would require the installation of an electrical wall outlet.

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<sup>2</sup> U.S. DOE, Energy Information Administration. 1990. *Household Energy Consumption and Expenditures 1987*. Washington, D.C. DOE/EIA-0321/1(87).

The installation cost of adding an electrical wall outlet to a kitchen was assumed to be \$90 (in 1990 dollars) based on information from the Gas Research Institute<sup>3</sup>. The \$90 value was substantiated with data from the *R.S. Means Repair & Remodeling Cost Data*<sup>4</sup>. Depending on the outlet type, cable type, and amp service, the total installation cost including overhead and profit ranges from \$35.50 to \$107. Values exceeding \$90 in the *R.S. Means Cost Data* are based on the use of EMT conduit, whose use is very unlikely for the installation of kitchen wall outlets. Also of note, ground fault interrupt (GFI) type outlets were not considered. According to the 1996 *National Electrical Code, article 210-8A6*, GFI electrical wall outlets are required in kitchens only where the receptacles are installed to provide electricity to counter top services.

The exact number of households that would require the installation of an electrical wall outlet is unknown. But two surveys, the 1990 *Residential Energy Consumption Survey (RECS)*<sup>5</sup> and the 1993 *American Housing Survey*<sup>6</sup>, were used to estimate the upper bound on the number of households which do not have electrical wall outlets in the kitchen. Refrigerator saturations from *RECS* were used to estimate the number of households that do not have an electrical wall outlet. The idea being that if a household has a refrigerator than it must have an electrical outlet in the kitchen as well. Supplemental Table 4.1 shows refrigerator saturations and housing stocks as reported by *RECS*.

**Supplemental Table 4.1** 1990 RECS Refrigerator Saturations and Housing Stocks

Housing Type	1990 Refrigerator Saturation	Percent Units without Refrigerators	1990 Housing Stock <i>million</i>	Housing Stock without Refrigerators <i>thousand</i>
Single-Family	99.8%	0.2%	64.36	128.7
Multi-Family	99.5%	0.5%	24.42	122.1
Mobile Home	100.0%	0.0%	5.21	0.0
<b>Total</b>				250.8

Thus, according to *RECS*, approximately 250 thousand households in the U.S. do not have

<sup>3</sup> Gas Research Institute. 1994. *Topical Report: Technical Input to NAECA Rulemaking for Gas-Fired Ranges*. Prepared by Battelle, Columbus, OH, American Gas Association Laboratories, Cleveland, OH, and Arthur D. Little, Cambridge, MA for Gas Appliance Technology Center, Chicago, IL. GRI-94/0195, July 1994.

<sup>4</sup> R.S. Means Company, Inc. 1997. *R.S. Means Repair & Remodeling Cost Data, 18<sup>th</sup> Annual Edition, Commercial/Residential*. Kingston, MA. pp. 328.

<sup>5</sup> U.S. DOE, Energy Information Administration. 1993. *Household Energy Consumption and Expenditures 1990*. Washington, D.C. DOE/EIA-0321/1(90).

<sup>6</sup> Department of Housing and Urban Development (HUD). 1993. *Codebook for the American Housing Survey*. Prepared by Abt Associates Inc., Cambridge, MA under HUD Contract #HC-5740 and revised by HUD and the Bureau of Census, Washington, DC.

refrigerators. It is assumed that almost all of these households have no electrical outlets in the kitchen. According to the *American Housing Survey*, 2.03% of U.S. households in 1993 did not have a working electrical outlet in every room. Using *RECS* housing statistics, this means that approximately 1.9 million U.S. households, according to the *American Housing Survey*, did not have a working electrical outlet in every room. It is likely that based on the *RECS* and *American Housing Survey* data, the number of households without electrical outlets in the kitchen is some where between 250 thousand and 1.9 million.

Due to the uncertainty regarding the number of households that might require an electrical wall outlet to accommodate the use of a gas cooking product with electric or electronic ignition, three installation cost scenarios are analyzed: 1) no installation cost for those homes with an existing outlet in the kitchen, 2) a \$90 installation cost for those homes requiring an outlet, and 3) an \$18 installation cost based on the conservative assumption that 20% of households would require an outlet. In the case of the \$18 installation cost scenario, LCCs are determined by calculating a weighted average value from the \$0 and \$90 cases. Specifically, the LCC for any single design option under the \$18 case is determined by multiplying the corresponding LCC for the \$90 case by 20% and adding to it the corresponding LCC for the \$0 case multiplied by 80%.

#### 4.1.2 Fuel Price Projections

For the LCC analysis, three different fuel price projections were used in order to encompass the full range of fuel price estimates. The three fuel price scenarios are based on projections from the *DOE/EIA 1995 Annual Energy Outlook*<sup>7</sup>, the *DOE/EIA 1997 Annual Energy Outlook*<sup>8</sup>, and the *Gas Research Institute (GRI) 1997 Edition of the Baseline Projection Data Book*<sup>9</sup>. Supplemental Table 4.2 provides the fuel prices projected from each of the above three sources for the year 2001. (The year 2001 is assumed to be the effective date of any new standard.) As discussed earlier, fuel prices incorporating end-use multipliers (1.11 for gas and 1.04 for electric) are used in the analysis.

**Supplemental Table 4.2** Fuel Price Projections for the year 2001 in 1990 dollars

Source	Gas		Electric	
	without end-use mult.	with end-use mult.	without end-use mult.	with end-use mult.
	\$/MMBtu	\$/MMBtu	\$/kWh	\$/kWh
1995 AEO	5.47	6.07	0.0743	0.0773
1997 AEO	4.80	5.33	0.0707	0.0735
1997 GRI	5.09	5.65	0.0662	0.0688

<sup>7</sup> U.S. DOE, Energy Information Administration. 1995. *Annual Energy Outlook with Projections to 2010*. Washington, DC. DOE/EIA-0383(95). January.

<sup>8</sup> U.S. DOE, Energy Information Administration. 1997. *Annual Energy Outlook with Projections to 2010*. Washington, DC. DOE/EIA-0383(97). January.

<sup>9</sup> Gas Research Institute (GRI). 1997. *Baseline Projection Data Book*. Prepared by Baseline/Gas Resource Analytical Center, Washington, DC for the Gas Research Institute, Chicago, IL.

### 4.1.3 LCC Results for Electric Non-Self Cleaning Ovens

Supplemental Tables 4.3 through 4.5 show the LCCs by design option for electric non-self cleaning ovens. Three tables are presented showing how LCC is impacted by the three different fuel price projections. Under all three fuel price projections, reduced vent rate and improved insulation (standard level two) are shown to have the least LCC except for LCCs calculated with a discount rate of 15%.

**Supplemental Table 4.3** Life-Cycle Cost for Electric Ovens, non Self-Cleaning: 1995 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost ( @6%)	Annual Energy Use (kWh)	Annual Energy Expense	Life-Cycle Costs		
										2%	6%	15%
1	0	Baseline	0.11	\$399	\$0	\$399.08	\$0	274.94	\$21.25	\$732	\$636	\$531
	1	0 + Reduced Vent Rate	0.11	\$403	\$0	\$402.55	\$0	263.23	\$20.34	\$721	\$630	\$529
	2	1 + Improved insulation	0.12	\$410	\$0	\$410.08	\$0	251.78	\$19.46	\$715	\$627	\$531
	3	2 + Improved seals	0.12	\$428	\$0	\$427.83	\$0	247.96	\$19.16	\$728	\$642	\$547

All dollar values in 1990\$

Fuel Prices based on AEO 1995 projections for the year 2001: Electricity price = 0.0773 \$/kWh

Lifetime = 19 years.

**Supplemental Table 4.4** Life-Cycle Cost for Electric Ovens, non Self-Cleaning: 1997 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost ( @6%)	Annual Energy Use (kWh)	Annual Energy Expense	Life-Cycle Costs		
										2%	6%	15%
1	0	Baseline	0.11	\$399	\$0	\$399.08	\$0	274.94	\$20.22	\$716	\$625	\$524
	1	0 + Reduced Vent Rate	0.11	\$403	\$0	\$402.55	\$0	263.23	\$19.35	\$706	\$619	\$523
	2	1 + Improved insulation	0.12	\$410	\$0	\$410.08	\$0	251.78	\$18.51	\$700	\$617	\$525
	3	2 + Improved seals	0.12	\$428	\$0	\$427.83	\$0	247.96	\$18.23	\$714	\$631	\$541

All dollar values in 1990\$

Fuel Prices based on AEO 1997 projections for the year 2001: Electricity price = 0.0735 \$/kWh

Lifetime = 19 years.

**Supplemental Table 4.5** Life-Cycle Cost for Electric Ovens, non Self-Cleaning: 1997 GRI Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost ( @6%)	Annual Energy Use (kWh)	Annual Energy Expense	Life-Cycle Costs		
										2%	6%	15%
1	0	Baseline	0.11	\$399	\$0	\$399.08	\$0	274.94	\$18.93	\$696	\$610	\$516
	1	0 + Reduced Vent Rate	0.11	\$403	\$0	\$402.55	\$0	263.23	\$18.12	\$687	\$605	\$515
	2	1 + Improved insulation	0.12	\$410	\$0	\$410.08	\$0	251.78	\$17.33	\$682	\$604	\$518
	3	2 + Improved seals	0.12	\$428	\$0	\$427.83	\$0	247.96	\$17.07	\$695	\$618	\$534

All dollar values in 1990\$

Fuel Prices based on GRI 1997 projections for the year 2001: Electricity price = 0.0688 \$/kWh

Lifetime = 19 years.

#### 4.1.4 LCC Results for Gas Cooking Appliances

Supplemental Table 4.6 summarizes the LCC results for the three classes of gas cooking appliances being analyzed here. Nine sets of LCCs are presented for each class to demonstrate how the LCC is impacted by the three different installation cost scenarios (\$0, \$90, and \$18) and the three fuel price projections (AEO 1995, AEO 1997, and GRI 1997).

**Supplemental Table 4.6** Summary of Life-Cycle Costs (@ 6% discount rate) for Gas Cooking Appliances

Standard Level	Design No.	Design Option	Installation Cost = \$0			Installation Cost = \$90			Installation Cost = \$18		
			AEO 1995	AEO 1997	GRI 1997	AEO 1995	AEO 1997	GRI 1997	AEO 1995	AEO 1997	GRI 1997
Gas Cooktops											
1,2	0	Baseline	\$447	\$419	\$432	\$447	\$419	\$432	\$447	\$419	\$432
3	1	0 + Electronic Igniton	\$415	\$404	\$409	\$505	\$494	\$499	\$433	\$422	\$427
Gas Ovens, non Self-Cleaning											
1,2	0	Baseline	\$681	\$657	\$668	\$681	\$657	\$668	\$681	\$657	\$668
3	1	0 + Electric Glo-bar Ignition	\$628	\$615	\$618	\$718	\$705	\$708	\$646	\$633	\$636
	8	0 + Electronic Ignition	\$691	\$679	\$684	\$781	\$769	\$774	\$709	\$697	\$702
Gas Ranges											
1,2	0	Baseline	\$1129	\$1076	\$1099	\$1129	\$1076	\$1099	\$1129	\$1076	\$1099
3a	1 + 1	0 + Glo-bar(Oven) / Electronic(Cktop)	\$1043	\$1019	\$1027	\$1133	\$1109	\$1117	\$1061	\$1037	\$1045
3b	1 + 8	0 + Both Electronic (Oven & Cktop)	\$1009	\$985	\$995	\$1099	\$1075	\$1085	\$1027	\$1003	\$1013

#### 4.1.4.1 LCC Results for Gas Cooktops

Supplemental Tables 4.7 through 4.15 show the LCCs by design option for gas cooktops. Nine tables are presented showing how LCC is impacted by the three different installation cost scenarios and the three different fuel price projections. Under all three different fuel price projections, electronic ignition (standard level three) is shown to have the least LCC (regardless of discount rate) for households not requiring an electrical outlet (installation cost of \$0). Under the \$90 installation cost scenario, the baseline model (standard levels one and two) has the least LCC regardless of the fuel price projection. For the \$18 installation cost scenario, electronic ignition has the least LCC for all discount rates under the 1995 AEO fuel price projection and for discount rates of 2% and 6% under the 1997 GRI fuel price projection.

**Supplemental Table 4.7** Life-Cycle Cost for Gas Cooktops: Installation Cost = \$0, 1995 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost (@6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2	0	Baseline	0.156	\$219	\$0	\$218.80	\$0.00	3.37	0.000	3.37	\$20.48	\$540	\$447	\$346
3	1	0 + Electronic Ignition	0.399	\$245	\$0	\$244.76	\$7.25	1.32	0.000	1.32	\$8.03	\$506	\$415	\$324

All dollar values in 1990\$

Fuel Prices based on AEO 1995 projections for the year 2001: Electricity price = 0.0773 \$/kWh, Gas price = 6.07 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.8** Life-Cycle Cost for Gas Cooktops: Installation Cost = \$0, 1997 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost (@6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2	0	Baseline	0.156	\$219	\$0	\$218.80	\$0.00	3.37	0.000	3.37	\$17.97	\$501	\$419	\$330
3	1	0 + Electronic Ignition	0.399	\$245	\$0	\$244.76	\$7.25	1.32	0.000	1.32	\$7.05	\$490	\$404	\$318

All dollar values in 1990\$

Fuel Prices based on AEO 1997 projections for the year 2001: Electricity price = 0.0735 \$/kWh, Gas price = 5.33 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.9** Life-Cycle Cost for Gas Cooktops: Installation Cost = \$0, 1997 GRI Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost (@6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2	0	Baseline	0.16	\$219	\$0	\$218.80	\$0.00	3.37	0.000	3.37	\$19.07	\$518	\$432	\$337
3	1	0 + Electronic Ignition	0.40	\$245	\$0	\$244.76	\$7.25	1.32	0.000	1.32	\$7.48	\$497	\$409	\$321

All dollar values in 1990\$

Fuel Prices based on GRI 1997 projections for the year 2001: Electricity price = 0.0688 \$/kWh, Gas price = 5.65 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.10** Life-Cycle Cost for Gas Cooktops: Installation Cost = \$90, 1995 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost (@6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2	0	Baseline	0.156	\$219	\$0	\$218.80	\$0.00	3.37	0.000	3.37	\$20.48	\$540	\$447	\$346
3	1	0 + Electronic Ignition	0.399	\$245	\$90	\$334.76	\$7.25	1.32	0.000	1.32	\$8.03	\$596	\$505	\$414

All dollar values in 1990\$

Fuel Prices based on AEO 1995 projections for the year 2001: Electricity price = 0.0773 \$/kWh , Gas price = 6.07 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.11** Life-Cycle Cost for Gas Cooktops: Installation Cost = \$90, 1997 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost (@6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2	0	Baseline	0.156	\$219	\$0	\$218.80	\$0.00	3.37	0.000	3.37	\$17.97	\$501	\$419	\$330
3	1	0 + Electronic Ignition	0.399	\$245	\$90	\$334.76	\$7.25	1.32	0.000	1.32	\$7.05	\$580	\$494	\$408

All dollar values in 1990\$

Fuel Prices based on AEO 1997 projections for the year 2001: Electricity price = 0.0735 \$/kWh , Gas price = 5.33 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.12** Life-Cycle Cost for Gas Cooktops: Installation Cost = \$90, 1997 GRI Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost (@6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2	0	Baseline	0.156	\$219	\$0	\$218.80	\$0.00	3.37	0.000	3.37	\$19.07	\$518	\$432	\$337
3	1	0 + Electronic Ignition	0.399	\$245	\$90	\$334.76	\$7.25	1.32	0.000	1.32	\$7.48	\$587	\$499	\$411

All dollar values in 1990\$

Fuel Prices based on GRI 1997 projections for the year 2001: Electricity price = 0.0688 \$/kWh , Gas price = 5.65 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.13** Life-Cycle Cost for Gas Cooktops: Installation Cost = \$18, 1995 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost (@6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2	0	Baseline	0.156	\$219	\$0	\$218.80	\$0.00	3.37	0.000	3.37	\$20.48	\$540	\$447	\$346
3	1	0 + Electronic Ignition	0.399	\$245	\$18	\$262.76	\$7.25	1.32	0.000	1.32	\$8.03	\$524	\$433	\$342

All dollar values in 1990\$

Fuel Prices based on AEO 1995 projections for the year 2001: Electricity price = 0.0773 \$/kWh , Gas price = 6.07 \$/MMBtu

Lifetime = 19 years.



**Supplemental Table 4.14** Life-Cycle Cost for Gas Cooktops: Installation = \$18, 1997 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost (@6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2	0	Baseline	0.156	\$219	\$0	\$218.80	\$0.00	3.37	0.000	3.37	\$17.97	\$501	\$419	\$330
3	1	0 + Electronic Ignition	0.399	\$245	\$18	\$262.76	\$7.25	1.32	0.000	1.32	\$7.05	\$508	\$422	\$336

All dollar values in 1990\$

Fuel Prices based on AEO 1997 projections for the year 2001: Electricity price = 0.0735 \$/kWh , Gas price = 5.33 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.15** Life-Cycle Cost for Gas Cooktops: Installation = \$18, 1997 GRI Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost (@6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2	0	Baseline	0.156	\$219	\$0	\$218.80	\$0.00	3.37	0.000	3.37	\$19.07	\$518	\$432	\$337
3	1	0 + Electronic Ignition	0.399	\$245	\$18	\$262.76	\$7.25	1.32	0.000	1.32	\$7.48	\$515	\$427	\$339

All dollar values in 1990\$

Fuel Prices based on GRI 1997 projections for the year 2001: Electricity price = 0.0688 \$/kWh , Gas price = 5.65 \$/MMBtu

Lifetime = 19 years.

#### 4.1.4.2 LCC Results for Gas Non-Self Cleaning Ovens

Supplemental Tables 4.16 through 4.24 show the LCCs by design option for gas non-self cleaning ovens. In addition to the first three standard levels consisting of the baseline model and electric ignition, the the LCC for electronic ignition is also shown. Thus, a direct comparison can be made between electric and electronic ignition. Nine tables are presented showing how LCC is impacted by the three different installation cost scenarios and the three different fuel price projections. Under all three different fuel price projections, electric ignition (standard level three) is shown to have the least LCC for the \$0 installation cost scenario. Electric ignition also has the least LCC under the \$18 installation cost scenario except for LCCs calculated with a discount rate of 15% using 1997 AEO and 1997 GRI fuel price projections. Under the \$90 installation cost scenario, the baseline model (standard levels one and two) has the least LCC regardless of the fuel price projection.

**Supplemental Table 4.16** Life-Cycle Cost for Gas Ovens, non Self-Cleaning:  
Installation Cost = \$0, 1995 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost ( @6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2 3	0	Baseline	0.030	\$479	\$0	\$479.49	\$0.00	2.98	0.00	2.98	\$18.10	\$763	\$681	\$592
	1	0 + Electric Glo-bar Ignition	0.058	\$503	\$0	\$502.80	\$0.00	1.41	34.16	1.52	\$11.19	\$678	\$628	\$572
	8	0 + Electronic Spark Ignition	0.058	\$507	\$0	\$507.00	\$7.25	1.52	0.00	1.52	\$9.26	\$787	\$691	\$594

All dollar values in 1990\$

Fuel Prices based on AEO 1995 projections for the year 2001: Electricity price = 0.0773 \$/kWh , Gas price = 6.07 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.17** Life-Cycle Cost for Gas Ovens, non Self-Cleaning:  
Installation Cost = \$0, 1997 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost ( @6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2 3	0	Baseline	0.030	\$479	\$0	\$479.49	\$0.00	2.98	0.00	2.98	\$15.89	\$729	\$657	\$578
	1	0 + Electric Glo-bar Ignition	0.058	\$503	\$0	\$502.80	\$0.00	1.41	34.16	1.52	\$10.01	\$660	\$615	\$565
	8	0 + Electronic Spark Ignition	0.058	\$507	\$0	\$507.00	\$7.25	1.52	0.00	1.52	\$8.12	\$769	\$679	\$587

All dollar values in 1990\$

Fuel Prices based on AEO 1997 projections for the year 2001: Electricity price = 0.0735 \$/kWh , Gas price = 5.33 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.18** Life-Cycle Cost for Gas Ovens, non Self-Cleaning:  
Installation Cost = \$0, 1997 GRI Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost ( @6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2 3	0	Baseline	0.030	\$479	\$0	\$479.49	\$0.00	2.98	0.00	2.98	\$16.86	\$744	\$668	\$584
	1	0 + Electric Glo-bar Ignition	0.058	\$503	\$0	\$502.80	\$0.00	1.41	34.16	1.52	\$10.31	\$664	\$618	\$567
	8	0 + Electronic Spark Ignition	0.058	\$507	\$0	\$507.00	\$7.25	1.52	0.00	1.52	\$8.62	\$777	\$684	\$590

All dollar values in 1990\$

Fuel Prices based on GRI 1997 projections for the year 2001: Electricity price = 0.0688 \$/kWh , Gas price = 5.65 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.19** Life-Cycle Cost for Gas Ovens, non Self-Cleaning:  
Installation Cost = \$90, 1995 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost ( @6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2 3	0	Baseline	0.030	\$479	\$0	\$479.49	\$0.00	2.98	0.00	2.98	\$18.10	\$763	\$681	\$592
	1	0 + Electric Glo-bar Ignition	0.058	\$503	\$90	\$592.80	\$0.00	1.41	34.16	1.52	\$11.19	\$768	\$718	\$662
	8	0 + Electronic Spark Ignition	0.058	\$507	\$90	\$597.00	\$7.25	1.52	0.00	1.52	\$9.26	\$877	\$781	\$684

All dollar values in 1990\$

Fuel Prices based on AEO 1995 projections for the year 2001: Electricity price = 0.0773 \$/kWh , Gas price = 6.07 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.20** Life-Cycle Cost for Gas Ovens, non Self-Cleaning:  
Installation Cost = \$90, 1997 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost ( @6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2 3	0	Baseline	0.030	\$479	\$0	\$479.49	\$0.00	2.98	0.00	2.98	\$15.89	\$729	\$657	\$578
	1	0 + Electric Glo-bar Ignition	0.058	\$503	\$90	\$592.80	\$0.00	1.41	34.16	1.52	\$10.01	\$750	\$705	\$655
	8	0 + Electronic Spark Ignition	0.058	\$507	\$90	\$597.00	\$7.25	1.52	0.00	1.52	\$8.12	\$859	\$769	\$677

All dollar values in 1990\$

Fuel Prices based on AEO 1997 projections for the year 2001: Electricity price = 0.0735 \$/kWh , Gas price = 5.33 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.21** Life-Cycle Cost for Gas Ovens, non Self-Cleaning:  
Installation Cost = \$90, 1997 GRI Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost ( @6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2 3	0	Baseline	0.030	\$479	\$0	\$479.49	\$0.00	2.98	0.00	2.98	\$16.86	\$744	\$668	\$584
	1	0 + Electric Glo-bar Ignition	0.058	\$503	\$90	\$592.80	\$0.00	1.41	34.16	1.52	\$10.31	\$754	\$708	\$657
	8	0 + Electronic Spark Ignition	0.058	\$507	\$90	\$597.00	\$7.25	1.52	0.00	1.52	\$8.62	\$867	\$774	\$680

All dollar values in 1990\$

Fuel Prices based on GRI 1997 projections for the year 2001: Electricity price = 0.0688 \$/kWh , Gas price = 5.65 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.22** Life-Cycle Cost for Gas Ovens, non Self-Cleaning:  
Installation Cost = \$18, 1995 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost ( @6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2 3	0	Baseline	0.030	\$479	\$0	\$479.49	\$0.00	2.98	0.00	2.98	\$18.10	\$763	\$681	\$592
	1	0 + Electric Glo-bar Ignition	0.058	\$503	\$18	\$520.80	\$0.00	1.41	34.16	1.52	\$11.19	\$696	\$646	\$590
	8	0 + Electronic Spark Ignition	0.058	\$507	\$18	\$525.00	\$7.25	1.52	0.00	1.52	\$9.26	\$805	\$709	\$612

All dollar values in 1990\$

Fuel Prices based on AEO 1995 projections for the year 2001: Electricity price = 0.0773 \$/kWh , Gas price = 6.07 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.23** Life-Cycle Cost for Gas Ovens, non Self-Cleaning:  
Installation Cost = \$18, 1997 AEO Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost ( @6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2 3	0	Baseline	0.030	\$479	\$0	\$479.49	\$0.00	2.98	0.00	2.98	\$15.89	\$729	\$657	\$578
	1	0 + Electric Glo-bar Ignition	0.058	\$503	\$18	\$520.80	\$0.00	1.41	34.16	1.52	\$10.01	\$678	\$633	\$583
	8	0 + Electronic Spark Ignition	0.058	\$507	\$18	\$525.00	\$7.25	1.52	0.00	1.52	\$8.12	\$787	\$697	\$605

All dollar values in 1990\$

Fuel Prices based on AEO 1997 projections for the year 2001: Electricity price = 0.0735 \$/kWh , Gas price = 5.33 \$/MMBtu

Lifetime = 19 years.

**Supplemental Table 4.24** Life-Cycle Cost for Gas Ovens, non Self-Cleaning:  
Installation Cost = \$18, 1997 GRI Fuel Prices

Standard Level	Design No.	Design Option	EF	Retail Price	Installation Cost	Installed Consumer Cost	Annual Maintenance Cost ( @6%)	Annual Energy Use			Annual Energy Expense	Life-Cycle Costs		
								Gas (MMBtu)	Electric (kWh)	Total (MMBtu)		2%	6%	15%
1,2 3	0	Baseline	0.030	\$479	\$0	\$479.49	\$0.00	2.98	0.00	2.98	\$16.86	\$744	\$668	\$584
	1	0 + Electric Glo-bar Ignition	0.058	\$503	\$18	\$520.80	\$0.00	1.41	34.16	1.52	\$10.31	\$682	\$636	\$585
	8	0 + Electronic Spark Ignition	0.058	\$507	\$18	\$525.00	\$7.25	1.52	0.00	1.52	\$8.62	\$795	\$702	\$608

All dollar values in 1990\$

Fuel Prices based on GRI 1997 projections for the year 2001: Electricity price = 0.0688 \$/kWh, Gas price = 5.65 \$/MMBtu

Lifetime = 19 years.

#### 4.1.4.3 LCC Results for Gas Ranges

Supplemental Tables 4.25 through 4.33 show the LCCs and simple payback periods by design option for gas non-self cleaning ranges (i.e. a gas cooking appliance consisting of a cooktop and a non-self cleaning oven). The LCC analysis for gas ranges was conducted by constructing energy use and consumer cost data from the gas cooktop and gas non-self cleaning oven data sets. For example, in the case of the gas range baseline model, annual energy use, installed consumer cost, and annual operating expense are constructed by adding the respective values from the baseline models for gas cooktops and gas non-self cleaning ovens. For each of the nine possible combinations of fuel price and installation cost, the gas cooktop and gas non-self cleaning oven data sets are presented along with the constructed data for the gas range.

In constructing the data for the gas range, two design paths were considered: one path where an electronic ignition device is used by the cooktop and an electric glo-bar ignition device is used by the oven and another path where both the cooktop and oven utilize electronic ignition. For the cases where the cost of an electrical wall outlet is considered, installation cost savings are realized for both of the above design paths. This is due to the situation that only one outlet is necessary for a gas range requiring electricity as opposed to the two outlets required when the individual components are analyzed separately. In the design path case where electronic ignition is utilized by both the cooktop and oven, factory cost and maintenance cost savings are realized as only a single control module is necessary for the gas range as opposed to the two control modules required when the individual components are analyzed separately.

Supplemental Tables 4.25 through 4.33 demonstrate how LCCs are impacted by the three different installation cost scenarios and the three different fuel price projections. In all nine cases, the gas range design path where electronic ignition is utilized by both of the individual components incurs the lowest LCCs. This is due to the factory cost and resulting retail price savings realized by requiring only one set of ignition controls. At a discount rate of 6%, the electronic ignition design option has a lower LCC than the baseline model for *all* installation cost and fuel price projection scenarios.

**Supplemental Table 4.25** Life-Cycle Cost for Gas Ranges: Installation Cost = \$0, 1995 AEO Fuel Prices

Life Cycle Costs and Payback Periods of GAS COOKTOPS																	
Previous Standard Level	Design No.	Design Option	Annual Energy Use			EF %	Total Factory Cost (1990\$)	Mark Up	Retail Cost	Installation Cost (1990\$)	Installed Consumer Cost (1990\$)	Annual Maintenance Cost (1990\$,6%)	Annual Energy cost (1990\$)	Total Annual Cost (1990\$,6%)	Lifecycle Costs		
			Gas (MMBtu)	Electric (kWh)	Total (MMBtu)										(1990\$)		
															2%	6%	15%
1,2	0	Baseline	3.37	0.00	3.37	0.156	\$89.09	2.456	\$218.80	\$0.00	\$218.80	\$0.00	\$20.48	\$20.48	\$540	\$447	\$346
3	1	0 + Electronic Ignition	1.32	0.00	1.32	0.399	\$101.15	2.420	\$244.76	\$0.00	\$244.76	\$7.25	\$8.03	\$15.28	\$506	\$415	\$324
Life Cycle Costs and Payback Periods of GAS OVENS Non Self-cleaning																	
1,2	0	Baseline	2.98	0.00	2.98	0.030	\$154.80	3.098	\$479.49	\$0.00	\$479.49	\$0.00	\$18.10	\$18.10	\$763	\$681	\$592
3	1	0 + Electric Glo-bar Ignition	1.41	34.16	1.52	0.058	\$166.86	3.013	\$502.80	\$0.00	\$502.80	\$0.00	\$11.19	\$11.19	\$678	\$628	\$572
	8	0 + Electronic Spark Ignition	1.52	0.00	1.52	0.058	\$169.80	2.986	\$507.00	\$0.00	\$507.00	\$7.25	\$9.26	\$16.51	\$787	\$691	\$594
Life Cycle Costs and Payback Periods of GAS RANGES																	
1,2	0	Baseline	6.35	0	6.35	NA	\$243.89	2.86	\$698.29	\$0.00	\$698.29	\$0.00	\$38.58	\$38.58	\$1,303	\$1,129	\$937
3a	1 + 1	0 + Glo-bar(Oven)/Electronic(Cktop)	2.73	34.16	2.85	NA	\$268.01	2.79	\$747.56	\$0.00	\$747.56	\$7.25	\$19.22	\$26.47	\$1,163	\$1,043	\$912
3b	1 + 8	0 + Both Electronic (Oven & Cktop)	2.85	0.00	2.85	NA	\$264.95	2.77	\$734.96	\$0.00	\$734.96	\$7.25	\$17.29	\$24.54	\$1,120	\$1,009	\$887

**Supplemental Table 4.26** Life-Cycle Cost for Gas Ranges: Installation Cost = \$0, 1997 AEO Fuel Prices

Life Cycle Costs and Payback Periods of GAS COOKTOPS																	
Previous Standard Level	Design No.	Design Option	Annual Energy Use			EF %	Total Factory Cost (1990\$)	Mark Up	Retail Cost	Installation Cost (1990\$)	Installed Consumer Cost (1990\$)	Annual Maintenance Cost (1990\$,6%)	Annual Energy cost (1990\$)	Total Annual Cost (1990\$,6%)	Lifecycle Costs		
			(MMBtu)	Electric (kWh)	Total (MMBtu)										(1990\$)		
															2%	6%	15%
1,2	0	Baseline	3.37	0.00	3.37	0.156	\$89.09	2.456	\$218.80	\$0.00	\$218.80	\$0.00	\$17.97	\$17.97	\$501	\$419	\$330
3	1	0 + Electronic Ignition	1.32	0.00	1.32	0.399	\$101.15	2.420	\$244.76	\$0.00	\$244.76	\$7.25	\$7.05	\$14.30	\$490	\$404	\$318
Life Cycle Costs and Payback Periods of GAS OVENS Non Self-cleaning																	
1,2	0	Baseline	2.98	0.00	2.98	0.030	\$154.80	3.098	\$479.49	\$0.00	\$479.49	\$0.00	\$15.89	\$15.89	\$729	\$657	\$578
3	1	0 + Electric Glo-bar Ignition	1.41	34.16	1.52	0.058	\$166.86	3.013	\$502.80	\$0.00	\$502.80	\$0.00	\$10.01	\$10.01	\$660	\$615	\$565
	8	0 + Electronic Spark Ignition	1.52	0.00	1.52	0.058	\$169.80	2.986	\$507.00	\$0.00	\$507.00	\$7.25	\$8.12	\$15.37	\$769	\$679	\$587
Life Cycle Costs and Payback Periods of GAS RANGES																	
1,2	0	Baseline	6.35	0	6.35	NA	\$243.89	2.86	\$698.29	\$0.00	\$698.29	\$0.00	\$33.86	\$33.86	\$1,229	\$1,076	\$908
3a	1 + 1	0 + Glo-bar(Oven)/Electronic(Cktop)	2.73	34.16	2.85	NA	\$268.01	2.79	\$747.56	\$0.00	\$747.56	\$7.25	\$17.06	\$24.31	\$1,129	\$1,019	\$898
3b	1 + 8	0 + Both Electronic (Oven & Cktop)	2.85	0.00	2.85	NA	\$264.95	2.77	\$734.96	\$0.00	\$734.96	\$7.25	\$15.17	\$22.42	\$1,086	\$985	\$874

**Supplemental Table 4.27** Life-Cycle Cost for Gas Ranges: Installation Cost = \$0, 1997 GRI Fuel Prices

Life Cycle Costs and Payback Periods of GAS COOKTOPS																	
Previous Standard Level	Design No.	Design Option	Annual Energy Use			EF %	Total Factory Cost (1990\$)	Mark Up	Retail Cost	Installation Cost (1990\$)	Installed Consumer Cost (1990\$)	Annual Maintenance Cost (1990\$,6%)	Annual Energy cost (1990\$)	Total Annual Cost (1990\$,6%)	Lifecycle Costs		
			(MMBtu)	Electric (kWh)	Total (MMBtu)										(1990\$)		
															2%	6%	15%
1,2	0	Baseline	3.37	0.00	3.37	0.156	\$89.09	2.456	\$218.80	\$0.00	\$218.80	\$0.00	\$19.07	\$19.07	\$518	\$432	\$337
3	1	0 + Electronic Ignition	1.32	0.00	1.32	0.399	\$101.15	2.420	\$244.76	\$0.00	\$244.76	\$7.25	\$7.48	\$14.73	\$497	\$409	\$321
Life Cycle Costs and Payback Periods of GAS OVENS Non Self-cleaning																	
1,2	0	Baseline	2.98	0.00	2.98	0.030	\$154.80	3.098	\$479.49	\$0.00	\$479.49	\$0.00	\$16.86	\$16.86	\$744	\$668	\$584
3	1	0 + Electric Glo-bar Ignition	1.41	34.16	1.52	0.058	\$166.86	3.013	\$502.80	\$0.00	\$502.80	\$0.00	\$10.31	\$10.31	\$664	\$618	\$567
	8	0 + Electronic Spark Ignition	1.52	0.00	1.52	0.058	\$169.80	2.986	\$507.00	\$0.00	\$507.00	\$7.25	\$8.62	\$15.87	\$777	\$684	\$590
Life Cycle Costs and Payback Periods of GAS RANGES																	
1,2	0	Baseline	6.35	0	6.35	NA	\$243.89	2.86	\$698.29	\$0.00	\$698.29	\$0.00	\$35.92	\$35.92	\$1,262	\$1,099	\$921
3a	1 + 1	0 + Glo-bar(Oven)/Electronic(Cktop)	2.73	34.16	2.85	NA	\$268.01	2.79	\$747.56	\$0.00	\$747.56	\$7.25	\$17.79	\$25.04	\$1,140	\$1,027	\$903
3b	1 + 8	0 + Both Electronic (Oven & Cktop)	2.85	0.00	2.85	NA	\$264.95	2.77	\$734.96	\$0.00	\$734.96	\$7.25	\$16.10	\$23.35	\$1,101	\$995	\$880

**Supplemental Table 4.28** Life-Cycle Cost for Gas Ranges: Installation Cost = \$90, 1995 AEO Fuel Prices

Life Cycle Costs and Payback Periods of GAS COOKTOPS																	
Previous Standard Level	Design No.	Design Option	Annual Energy Use			EF %	Total Factory Cost (1990\$)	Mark Up	Retail Cost	Installation Cost (1990\$)	Installed Consumer Cost (1990\$)	Annual Maintenance Cost (1990\$,6%)	Annual Energy cost (1990\$)	Total Annual Cost (1990\$,6%)	Lifecycle Costs		
			Electric (MMBtu)	Total (MMBtu)	(1990\$)												
					2%										6%	15%	
1,2	0	Baseline	3.37	0.00	3.37	0.156	\$89.09	2.456	\$218.80	\$0.00	\$218.80	\$0.00	\$20.48	\$20.48	\$540	\$447	\$346
3	1	0 + Electronic Ignition	1.32	0.00	1.32	0.399	\$101.15	2.420	\$244.76	\$90.00	\$334.76	\$7.25	\$8.03	\$15.28	\$596	\$505	\$414
Life Cycle Costs and Payback Periods of GAS OVENS Non Self-cleaning																	
1,2	0	Baseline	2.98	0.00	2.98	0.030	\$154.80	3.098	\$479.49	\$0.00	\$479.49	\$0.00	\$18.10	\$18.10	\$763	\$681	\$592
3	1	0 + Electric Glo-bar Ignition	1.41	34.16	1.52	0.058	\$166.86	3.013	\$502.80	\$90.00	\$592.80	\$0.00	\$11.19	\$11.19	\$768	\$718	\$662
	8	0 + Electronic Spark Ignition	1.52	0.00	1.52	0.058	\$169.80	2.986	\$507.00	\$90.00	\$597.00	\$7.25	\$9.26	\$16.51	\$877	\$781	\$684
Life Cycle Costs and Payback Periods of GAS RANGES																	
1,2	0	Baseline	6.35	0	6.35	NA	\$243.89	2.86	\$698.29	\$0.00	\$698.29	\$0.00	\$38.58	\$38.58	\$1,303	\$1,129	\$937
3a	1 + 1	0 + Glo-bar(Oven)/Electronic(Cktop)	2.73	34.16	2.85	NA	\$268.01	2.79	\$747.56	\$90.00	\$837.56	\$7.25	\$19.22	\$26.47	\$1,253	\$1,133	\$1,002
3b	1 + 8	0 + Both Electronic (Oven & Cktop)	2.85	0.00	2.85	NA	\$264.95	2.77	\$734.96	\$90.00	\$824.96	\$7.25	\$17.29	\$24.54	\$1,210	\$1,099	\$977

**Supplemental Table 4.29** Life-Cycle Cost for Gas Ranges: Installation Cost = \$90, 1997 AEO Fuel Prices

Life Cycle Costs and Payback Periods of GAS COOKTOPS																	
Previous Standard Level	Design No.	Design Option	Annual Energy Use			EF %	Total Factory Cost (1990\$)	Mark Up	Retail Cost	Installation Cost (1990\$)	Installed Consumer Cost (1990\$)	Annual Maintenance Cost (1990\$,6%)	Annual Energy cost (1990\$)	Total Annual Cost (1990\$,6%)	Lifecycle Costs		
			(MMBtu)	Electric (kWh)	Total (MMBtu)										(1990\$)		
															2%	6%	15%
1,2	0	Baseline	3.37	0.00	3.37	0.156	\$89.09	2.456	\$218.80	\$0.00	\$218.80	\$0.00	\$17.97	\$17.97	\$501	\$419	\$330
3	1	0 + Electronic Ignition	1.32	0.00	1.32	0.399	\$101.15	2.420	\$244.76	\$90.00	\$334.76	\$7.25	\$7.05	\$14.30	\$580	\$494	\$408
Life Cycle Costs and Payback Periods of GAS OVENS Non Self-cleaning																	
1,2	0	Baseline	2.98	0.00	2.98	0.030	\$154.80	3.098	\$479.49	\$0.00	\$479.49	\$0.00	\$15.89	\$15.89	\$729	\$657	\$578
3	1	0 + Electric Glo-bar Ignition	1.41	34.16	1.52	0.058	\$166.86	3.013	\$502.80	\$90.00	\$592.80	\$0.00	\$10.01	\$10.01	\$750	\$705	\$655
	8	0 + Electronic Spark Ignition	1.52	0.00	1.52	0.058	\$169.80	2.986	\$507.00	\$90.00	\$597.00	\$7.25	\$8.12	\$15.37	\$859	\$769	\$677
Life Cycle Costs and Payback Periods of GAS RANGES																	
1,2	0	Baseline	6.35	0	6.35	NA	\$243.89	2.86	\$698.29	\$0.00	\$698.29	\$0.00	\$33.86	\$33.86	\$1,229	\$1,076	\$908
3a	1 + 1	0 + Glo-bar(Oven)/Electronic(Cktop)	2.73	34.16	2.85	NA	\$268.01	2.79	\$747.56	\$90.00	\$837.56	\$7.25	\$17.06	\$24.31	\$1,219	\$1,109	\$988
3b	1 + 8	0 + Both Electronic (Oven & Cktop)	2.85	0.00	2.85	NA	\$264.95	2.77	\$734.96	\$90.00	\$824.96	\$7.25	\$15.17	\$22.42	\$1,176	\$1,075	\$964

**Supplemental Table 4.30** Life-Cycle Cost for Gas Ranges: Installation Cost = \$90, 1997 GRI Fuel Prices

Life Cycle Costs and Payback Periods of GAS COOKTOPS																	
Previous Standard Level	Design No.	Design Option	Annual Energy Use			EF %	Total Factory Cost (1990\$)	Mark Up	Retail Cost	Installation Cost (1990\$)	Installed Consumer Cost (1990\$)	Annual Maintenance Cost (1990\$,6%)	Annual Energy cost (1990\$)	Total Annual Cost (1990\$,6%)	Lifecycle Costs		
			(MMBtu)	Electric (kWh)	Total (MMBtu)										(1990\$)		
															2%	6%	15%
1,2	0	Baseline	3.37	0.00	3.37	0.156	\$89.09	2.456	\$218.80	\$0.00	\$218.80	\$0.00	\$19.07	\$19.07	\$518	\$432	\$337
3	1	0 + Electronic Ignition	1.32	0.00	1.32	0.399	\$101.15	2.420	\$244.76	\$90.00	\$334.76	\$7.25	\$7.48	\$14.73	\$587	\$499	\$411
Life Cycle Costs and Payback Periods of GAS OVENS Non Self-cleaning																	
1,2	0	Baseline	2.98	0.00	2.98	0.030	\$154.80	3.098	\$479.49	\$0.00	\$479.49	\$0.00	\$16.86	\$16.86	\$744	\$668	\$584
3	1	0 + Electric Glo-bar Ignition	1.41	34.16	1.52	0.058	\$166.86	3.013	\$502.80	\$90.00	\$592.80	\$0.00	\$10.31	\$10.31	\$754	\$708	\$657
	8	0 + Electronic Spark Ignition	1.52	0.00	1.52	0.058	\$169.80	2.986	\$507.00	\$90.00	\$597.00	\$7.25	\$8.62	\$15.87	\$867	\$774	\$680
Life Cycle Costs and Payback Periods of GAS RANGES																	
1,2	0	Baseline	6.35	0	6.35	NA	\$243.89	2.86	\$698.29	\$0.00	\$698.29	\$0.00	\$35.92	\$35.92	\$1,262	\$1,099	\$921
3a	1 + 1	0 + Glo-bar(Oven)/Electronic(Cktop)	2.73	34.16	2.85	NA	\$268.01	2.79	\$747.56	\$90.00	\$837.56	\$7.25	\$17.79	\$25.04	\$1,230	\$1,117	\$993
3b	1 + 8	0 + Both Electronic (Oven & Cktop)	2.85	0.00	2.85	NA	\$264.95	2.77	\$734.96	\$90.00	\$824.96	\$7.25	\$16.10	\$23.35	\$1,191	\$1,085	\$970

**Supplemental Table 4.31** Life-Cycle Cost for Gas Ranges: Installation Cost = \$18, 1995 AEO Fuel Prices

Life Cycle Costs and Payback Periods of GAS COOKTOPS																	
Previous Standard Level	Design No.	Design Option	Annual Energy Use			EF %	Total Factory Cost (1990\$)	Mark Up	Retail Cost	Installation Cost (1990\$)	Installed Consumer Cost (1990\$)	Annual Maintenance Cost (1990\$,6%)	Annual Energy cost (1990\$)	Total Annual Cost (1990\$,6%)	Lifecycle Costs		
			Gas (MMBtu)	Electric (kWh)	Total (MMBtu)										(1990\$)		
															2%	6%	15%
1,2	0	Baseline	3.37	0.00	3.37	0.156	\$89.09	2.456	\$218.80	\$0.00	\$218.80	\$0.00	\$20.48	\$20.48	\$540	\$447	\$346
3	1	0 + Electronic Ignition	1.32	0.00	1.32	0.399	\$101.15	2.420	\$244.76	\$18.00	\$262.76	\$7.25	\$8.03	\$15.28	\$524	\$433	\$342
Life Cycle Costs and Payback Periods of GAS OVENS Non Self-cleaning																	
1,2	0	Baseline	2.98	0.00	2.98	0.030	\$154.80	3.098	\$479.49	\$0.00	\$479.49	\$0.00	\$18.10	\$18.10	\$763	\$681	\$592
3	1	0 + Electric Glo-bar Ignition	1.41	34.16	1.52	0.058	\$166.86	3.013	\$502.80	\$18.00	\$520.80	\$0.00	\$11.19	\$11.19	\$696	\$646	\$590
	8	0 + Electronic Spark Ignition	1.52	0.00	1.52	0.058	\$169.80	2.986	\$507.00	\$18.00	\$525.00	\$7.25	\$9.26	\$16.51	\$805	\$709	\$612
Life Cycle Costs and Payback Periods of GAS RANGES																	
1,2	0	Baseline	6.35	0	6.35	NA	\$243.89	2.86	\$698.29	\$0.00	\$698.29	\$0.00	\$38.58	\$38.58	\$1,303	\$1,129	\$937
3a	1 + 1	0 + Glo-bar(Oven)/Electronic(Cktop)	2.73	34.16	2.85	NA	\$268.01	2.79	\$747.56	\$18.00	\$765.56	\$7.25	\$19.22	\$26.47	\$1,181	\$1,061	\$930
3b	1 + 8	0 + Both Electronic (Oven & Cktop)	2.85	0.00	2.85	NA	\$264.95	2.77	\$734.96	\$18.00	\$752.96	\$7.25	\$17.29	\$24.54	\$1,138	\$1,027	\$905

**Supplemental Table 4.32** Life-Cycle Cost for Gas Ranges: Installation Cost = \$18, 1997 AEO Fuel Prices

Life Cycle Costs and Payback Periods of GAS COOKTOPS																	
Previous Standard Level	Design No.	Design Option	Annual Energy Use			EF %	Total Factory Cost (1990\$)	Mark Up	Retail Cost	Installation Cost (1990\$)	Installed Consumer Cost (1990\$)	Annual Maintenance Cost (1990\$,6%)	Annual Energy cost (1990\$)	Total Annual Cost (1990\$,6%)	Lifecycle Costs		
			(MMBtu)	Electric (kWh)	Total (MMBtu)										(1990\$)		
															2%	6%	15%
1,2	0	Baseline	3.37	0.00	3.37	0.156	\$89.09	2.456	\$218.80	\$0.00	\$218.80	\$0.00	\$17.97	\$17.97	\$501	\$419	\$330
3	1	0 + Electronic Ignition	1.32	0.00	1.32	0.399	\$101.15	2.420	\$244.76	\$18.00	\$262.76	\$7.25	\$7.05	\$14.30	\$508	\$422	\$336
Life Cycle Costs and Payback Periods of GAS OVENS Non Self-cleaning																	
1,2	0	Baseline	2.98	0.00	2.98	0.030	\$154.80	3.098	\$479.49	\$0.00	\$479.49	\$0.00	\$15.89	\$15.89	\$729	\$657	\$578
3	1	0 + Electric Glo-bar Ignition	1.41	34.16	1.52	0.058	\$166.86	3.013	\$502.80	\$18.00	\$520.80	\$0.00	\$10.01	\$10.01	\$678	\$633	\$583
	8	0 + Electronic Spark Ignition	1.52	0.00	1.52	0.058	\$169.80	2.986	\$507.00	\$18.00	\$525.00	\$7.25	\$8.12	\$15.37	\$787	\$697	\$605
Life Cycle Costs and Payback Periods of GAS RANGES																	
1,2	0	Baseline	6.35	0	6.35	NA	\$243.89	2.86	\$698.29	\$0.00	\$698.29	\$0.00	\$33.86	\$33.86	\$1,229	\$1,076	\$908
3a	1 + 1	0 + Glo-bar(Oven)/Electronic(Cktop)	2.73	34.16	2.85	NA	\$268.01	2.79	\$747.56	\$18.00	\$765.56	\$7.25	\$17.06	\$24.31	\$1,147	\$1,037	\$916
3b	1 + 8	0 + Both Electronic (Oven & Cktop)	2.85	0.00	2.85	NA	\$264.95	2.77	\$734.96	\$18.00	\$752.96	\$7.25	\$15.17	\$22.42	\$1,104	\$1,003	\$892



**Supplemental Table 4.33** Life-Cycle Cost for Gas Ranges: Installation Cost = \$18, 1997 GRI Fuel Prices

Life Cycle Costs and Payback Periods of GAS COOKTOPS																	
Previous Standard Level	Design No.	Design Option	Annual Energy Use			EF %	Total Factory Cost (1990\$)	Mark Up	Retail Cost	Installation Cost (1990\$)	Installed Consumer Cost (1990\$)	Annual Maintenance Cost (1990\$,6%)	Annual Energy cost (1990\$)	Total Annual Cost (1990\$,6%)	Lifecycle Costs		
			(MMBtu)	Electric (kWh)	Total (MMBtu)										(1990\$)		
															2%	6%	15%
1,2	0	Baseline	3.37	0.00	3.37	0.156	\$89.09	2.456	\$218.80	\$0.00	\$218.80	\$0.00	\$19.07	\$19.07	\$518	\$432	\$337
3	1	0 + Electronic Ignition	1.32	0.00	1.32	0.399	\$101.15	2.420	\$244.76	\$18.00	\$262.76	\$7.25	\$7.48	\$14.73	\$515	\$427	\$339
Life Cycle Costs and Payback Periods of GAS OVENS Non Self-cleaning																	
1,2	0	Baseline	2.98	0.00	2.98	0.030	\$154.80	3.098	\$479.49	\$0.00	\$479.49	\$0.00	\$16.86	\$16.86	\$744	\$668	\$584
3	1	0 + Electric Glo-bar Ignition	1.41	34.16	1.52	0.058	\$166.86	3.013	\$502.80	\$18.00	\$520.80	\$0.00	\$10.31	\$10.31	\$682	\$636	\$585
	8	0 + Electronic Spark Ignition	1.52	0.00	1.52	0.058	\$169.80	2.986	\$507.00	\$18.00	\$525.00	\$7.25	\$8.62	\$15.87	\$795	\$702	\$608
Life Cycle Costs and Payback Periods of GAS RANGES																	
1,2	0	Baseline	6.35	0	6.35	NA	\$243.89	2.86	\$698.29	\$0.00	\$698.29	\$0.00	\$35.92	\$35.92	\$1,262	\$1,099	\$921
3a	1 + 1	0 + Glo-bar(Oven)/Electronic(Cktop)	2.73	34.16	2.85	NA	\$268.01	2.79	\$747.56	\$18.00	\$765.56	\$7.25	\$17.79	\$25.04	\$1,158	\$1,045	\$921
3b	1 + 8	0 + Both Electronic (Oven & Cktop)	2.85	0.00	2.85	NA	\$264.95	2.77	\$734.96	\$18.00	\$752.96	\$7.25	\$16.10	\$23.35	\$1,119	\$1,013	\$898

## 4.2 LCC SENSITIVITY ANALYSIS

The national LCC results in Supplemental Section 4.1 were tested for sensitivity by varying assumptions about energy prices for each product class. The results of this analysis should be compared to the LCC tables in Supplemental Section 4.1.

Low and high energy prices were defined as the minimum and maximum, respectively, of states' energy prices. State energy prices were taken from the Energy Information Administration's *State Energy Price and Expenditure Report 1994*<sup>10</sup>. The latest year for which energy prices are reported is 1994. Low and high natural gas and electricity prices with and without energy price end-use factors of 1.04 for electric and 1.11 for gas are reported in Supplemental Table 4.34.

**Supplemental Table 4.34** Low and High State Energy Prices in 1990 dollars

Type	Gas		Electric	
	without end-use multiplier	with end-use multiplier	without end-use multiplier	with end-use multiplier
	\$/MMBtu	\$/MMBtu	\$/kWh	\$/kWh
Low State Energy Price	3.17	3.52	0.0438	0.0456
High State Energy Price	14.12	15.67	0.1195	0.1243

Supplemental Tables 4.35 through 4.38 summarize the results of the energy price sensitivity analysis for each of the four product classes analyzed here. For the gas cooking appliances, the low and high energy prices are used to determine LCCs for only the \$0 and \$90 installation cost scenarios. In Supplemental Tables 4.35 through 4.38, the LCC reference cases based on the *1995 AEO*, *1997 AEO*, and the *1997 GRI* fuel price projections are provided.

**Supplemental Table 4.35** Summary of LCC Sensitivities for Electric Ovens, non Self-Cleaning

Standar	Design		AEO	AEO	GRI	Low	High
Level	No.	Design Option	1995	1997	1997	Prices	Prices
	0	Baseline	\$636	\$625	\$610	\$539	\$780
1	1	0 + Reduced Vent Rate	\$630	\$619	\$605	\$536	\$768
2	2	1 + Improved insulation	\$627	\$617	\$604	\$538	\$759
3	3	2 + Improved seals	\$642	\$631	\$618	\$554	\$772

All values in 1990\$ @ 6% discount rate.

<sup>10</sup> U.S. Department of Energy, Energy Information Administration. 1994. *State Energy Price and Expenditure Report 1994*. Washington, D.C. DOE/EIA-0376(94). June, 1997.

**Supplemental Table 4.36** Summary of LCC Sensitivities for Gas Cooktops

Standard Design			Installation Cost = \$0					Installation Cost = \$90				
			AEO	AEO	GRI	Low	High	AEO	AEO	GRI	Low	High
Level	No.	Design Option	1995	1997	1997	Prices	Prices	1995	1997	1997	Prices	Prices
1,2	0	Baseline	\$447	\$419	\$432	\$351	\$809	\$447	\$419	\$432	\$351	\$809
3	1	0 + Electronic Igniton	\$415	\$404	\$409	\$378	\$557	\$505	\$494	\$499	\$468	\$647

All values in 1990\$ @ 6% discount rate.

**Supplemental Table 4.37** Summary of LCC Sensitivities for Gas Ovens, non Self-Cleaning

Standard Design			Installation Cost = \$0					Installation Cost = \$90				
			AEO	AEO	GRI	Low	High	AEO	AEO	GRI	Low	High
Level	No.	Design Option	1995	1997	1997	Prices	Prices	1995	1997	1997	Prices	Prices
1,2	0	Baseline	\$681	\$657	\$668	\$597	\$1001	\$681	\$657	\$668	\$597	\$1001
3	1	0 + Electric Glo-Bar Ignition	\$628	\$615	\$618	\$575	\$796	\$718	\$705	\$708	\$665	\$886
	8	0 + Electronic Ignition	\$691	\$679	\$684	\$648	\$854	\$781	\$769	\$774	\$738	\$944

All values in 1990\$ @ 6% discount rate.

**Supplemental Table 4.38** Summary of LCC Sensitivities for Gas Ranges

Standard Design			Installation Cost = \$0					Installation Cost = \$90				
			AEO	AEO	GRI	Low	High	AEO	AEO	GRI	Low	High
Level	No.	Design Option	1995	1997	1997	Prices	Prices	1995	1997	1997	Prices	Prices
1,2	0	Baseline	\$1129	\$1076	\$1099	\$948	\$1810	\$1129	\$1076	\$1099	\$948	\$1810
3a	1 + 1	0 + Glo-bar (Oven)/Electronic (Cktp)	\$1043	\$1019	\$1027	\$953	\$1353	\$1133	\$1109	\$1117	\$1043	\$1443
3b	1 + 8	0 + Both Electronic (Oven & Cktp)	\$1009	\$985	\$995	\$928	\$1314	\$1099	\$1075	\$1085	\$1018	\$1404

All values in 1990\$ @ 6% discount rate.

### 4.3 STANDARD LEVEL IMPACTS ON LIFE-CYCLE COST DIFFERENCES, PAYBACK PERIODS, AND COST OF CONSERVED ENERGY

Standard levels correspond to a set of design options. For the four classes of residential cooking products being analyzed here, the previous LCC tables indicate which design option or set of design options correspond to a particular standard or efficiency level. There are five standard levels considered for each residential cooking product class. In addition to the previous tables demonstrating how a particular standard level affects LCC, the impact of standard levels is further assessed by calculating life-cycle cost (LCC) differences, payback periods (PBP), and cost of conserved energy (CCE).

The LCC difference is determined by subtracting the LCC for the standards case from the LCC for the base case. If the LCC difference is greater than zero (positive savings), the standard level provides a net decrease in expenses to the consumer. That is, the present value of decreased operating expenses offsets the increased purchase price. Conversely, if the LCC difference is negative, the efficiency level causes a net increase in expenses to the consumer.

The payback period (PBP) measures the amount of time needed to recover the additional consumer investment in increased efficiency through lower operating costs. PBP is found by solving the equation:

$$\Delta PC + \sum_{t=1}^{PBP} \Delta OC_t = 0 \quad (4.4)$$

for *PBP*, where PC=purchase price and OC=operating cost. In general, *PBP* is found by interpolating between the two years when the above expression changes sign. If the operating cost is constant, the equation has the simple solution:

$$PBP = -\frac{\Delta PC}{\Delta OC} \quad (4.5)$$

Numerically, the PBP is the ratio of the increase in purchase (and installation) price from the base to the efficiency levels cases to the decrease in annual operating expenditures (including maintenance).

PBPs are expressed in years. A PBP of three years means that the increased purchase price is equal to three times the value of reduced operating expenses achieved in the year of purchase, or that the increased purchase price is recovered in approximately three years because of lower operating expenses. PBPs greater than the life of the product mean that the increased purchase price is not recovered in reduced operating expenses.

The cost of conserved energy (CCE) is the increase in purchase price amortized over the lifetime of the appliance at the consumer discount rate divided by the annual energy savings:

$$CCE = -\frac{CRF \cdot \Delta PC}{\Delta E}, \quad (4.6)$$

where the capital recovery factor ( $CRF = 1/PWF$ ) is used to annualize the capital costs. Note that although the CCE can be measured in cents per kWh, it does not depend on current or future energy prices. The consumer will benefit whenever the cost of conserved energy is less than the price of energy for that end use.

Supplemental Tables 4.37 through 4.57 show the calculation of LCC differences, PBP, and CCE. The tables showing the calculation of LCC differences, PBPs, and CCEs are composed of several parts. Part “a” summarizes for each design option the installed consumer cost, annual energy use, and operating expense; LCC (at 6% consumer discount rate); and the distribution of units sold in 2001, according to the base case forecast as determined by LBNL-REM. Part “b” applies the weights from the distributions listed in the last column of part “a” to the values in each preceding column in order to obtain weighted average values. Finally, Part “c” shows the resulting LCC

differences, PBPs, and CCE. In Part “c”, PBPs are presented which are based upon energy use data determined both from the proposed DOE test procedure and recent field measurements. As discussed in the earlier *Draft Report* on residential cooking products, recent field data indicate that the annual energy use of ovens and cooktops is approximately 12-17% lower than that determined with proposed DOE test procedure calculations. Because the field data indicate lower energy use, “field-based” PBPs are typically greater than those determined with the proposed test procedure.

#### **4.3.1 Data Inputs for Calculating LCC Differences, PBPs, and CCEs**

The data required for calculating LCC differences, PBPs, and CCEs have been discussed previously. In addition, the calculation requires that a distribution of design options is projected (by LBNL-REM) for the base case. Only those designs that are eliminated by the standard level are included in the calculation of impacts. Consumers whose base case choice is eliminated by standard levels are assumed to purchase the design option corresponding to the minimum compliance with the standard level.

#### **4.3.2 Results for LCC Difference**

Supplemental Table 4.39 summarizes the LCC differences for each of the cooking products analyzed here. Supplemental Tables 4.42 through 4.71 show the “detailed” parts necessary for calculating the LCC differences for each cooking product’s first three standard levels. Of these “detailed” tables, one set corresponds to a single product class evaluated at a single fuel price projection (either 1995 AEO, 1997 AEO, or 1997 GRI) and, where applicable, a single installation cost (either \$0, \$90 or \$18). Three sets of tables are presented for electric non-self cleaning ovens (Supplemental Tables 4.42 through 4.44). Nine sets of tables are presented each for gas cooktops (Supplemental Tables 4.45 through 4.53), gas non-self cleaning ovens (Supplemental Tables 4.54 through 4.62), and gas ranges (Supplemental Tables 4.63 through 4.71). The results presented in part “c” are the weighted average of LCC differences comparing that portion of the projected distribution of designs in the base case that are less efficient than the standard level to the design at the standard level. Designs with energy consumption at or below the standard level are not affected by the standard level, so these are excluded from the calculation of impacts. These LCCs are calculated at a 6% discount rate; a higher discount rate (e.g., 15%) gives a smaller difference.

**Supplemental Table 4.39** Summary of LCC Differences (@ 6% discount rate)

Standard Level	Design No.	Design Option	Installation Cost = \$0			Installation Cost = \$90			Installation Cost = \$18		
			AEO 1995	AEO 1997	GRI 1997	AEO 1995	AEO 1997	GRI 1997	AEO 1995	AEO 1997	GRI 1997
Electric Ovens, non Self-Cleaning											
	0	Baseline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	1	0 + Reduced Vent Rate	\$6.6	\$6.1	\$5.5	N/A	N/A	N/A	N/A	N/A	N/A
2	2	1 + Improved Insulation	\$9.0	\$8.0	\$6.8	N/A	N/A	N/A	N/A	N/A	N/A
3	3	2 + Improved Seals	\$-5.5	\$-6.6	\$-8.0	N/A	N/A	N/A	N/A	N/A	N/A
Gas Cooktops											
1,2	0	Baseline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	1	0 + Electronic Ignition	\$32.0	\$15.0	\$22.5	\$-58.0	\$-75.0	\$-67.5	\$14.0	\$-3.0	\$4.5
Gas Ovens, non Self-Cleaning											
1,2	0	Baseline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	1	0 + Electric Glo-bar Ignition	\$53.6	\$42.0	\$49.5	\$-36.4	\$-48.0	\$-40.5	\$35.6	\$24.0	\$31.5
Gas Ranges											
1,2	0	Baseline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3a	1 + 1	0 + Glo-bar(Oven) / Electronic(Cktop)	\$85.9	\$57.2	\$72.2	\$-4.1	\$-32.8	\$-17.8	\$67.9	\$39.2	\$54.2
3b	1 + 8	0 + Both Electronic (Oven & Cktop)	\$120.0	\$90.9	\$103.7	\$30.0	\$0.9	\$13.7	\$102.0	\$72.9	\$85.7

### 4.3.3 PBP Results

Supplemental Table 4.40 summarizes the payback periods (PBPs) of the cooking products analyzed here. Supplemental Tables 4.42 through 4.71 show the “detailed” parts necessary for calculating the PBPs for each cooking product’s first three standard levels. The PBPs by standard level shown in Supplemental Tables 4.42 through 4.71 are the weighted averages. They compare that portion of the projected distribution of designs in the base case which are less efficient than the standard level to the design at the standard level. Designs with energy consumption at or below the standard level are not affected by the standard level, and so are excluded from the calculation of impacts.

**Supplemental Table 4.40** Summary of Payback Periods (years)

Supplemental Table 11b: Summary of Payback Periods (years)											
Standard Level	Design No.	Design Option	Installation Cost = \$0			Installation Cost = \$90			Installation Cost = \$18		
			AEO 1995	AEO 1997	GRI 1997	AEO 1995	AEO 1997	GRI 1997	AEO 1995	AEO 1997	GRI 1997
Electric Ovens, non Self-Cleaning											
	0	Baseline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	1	0 + Reduced Vent Rate	3.8	4.0	4.3	N/A	N/A	N/A	N/A	N/A	N/A
2	2	1 + Improved Insulation	6.1	6.5	6.9	N/A	N/A	N/A	N/A	N/A	N/A
3	3	2 + Improved Seals	13.8	14.5	15.5	N/A	N/A	N/A	N/A	N/A	N/A
Gas Cooktops											
1,2	0	Baseline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	1	0 + Electronic Ignition	5.0	7.1	6.0	22.3	31.6	26.7	8.5	12.0	10.1
Gas Ovens, non Self-Cleaning											
1,2	0	Baseline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	1	0 + Electric Glo-bar Ignition	3.4	4.0	3.6	16.4	19.4	17.4	6.0	7.1	6.3
Gas Ranges											
1,2	0	Baseline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3a	1 + 1	0 + Glo-bar(Oven) / Electronic(Cktop)	4.1	5.2	4.5	11.5	14.6	12.8	5.6	7.0	6.2
3b	1 + 8	0 + Both Electronic (Oven & Cktop)	2.6	3.2	2.9	9.0	11.1	10.1	3.9	4.8	4.3

#### 4.3.4 CCE Results

Supplemental Table 4.41 summarizes the CCEs of the cooking products analyzed here. Supplemental Tables 4.42 through 4.71 show the “detailed” parts necessary for calculating the CEEs for each cooking product’s first three standard levels. Supplemental Tables 4.42 through 4.71 show the CCE energy (site) of the standard levels as compared to the base case. CCEs for electric non-self cleaning electric ovens are presented in ¢/kWh while CCEs for gas cooking appliances are presented in \$/MMBtu. Note that the projected (2001) average residential electricity and gas prices (with end-use multipliers) according to the *1995 AEO*, the *1997 AEO*, and the *1997 GRI* are 7.73 ¢/kWh and 6.07 \$/MMBtu, 7.35 ¢/kWh and 5.33 \$/MMBtu, 6.88 ¢/kWh and 5.65 \$/MMBtu, respectively.

**Supplemental Table 4.41** Summary of Cost of Conserved Energy

Standard Level	Design No.	Design Option	Installation Cost = \$0			Installation Cost = \$90			Installation Cost = \$18		
			AEO 1995	AEO 1997	GRI 1997	AEO 1995	AEO 1997	GRI 1997	AEO 1995	AEO 1997	GRI 1997
Electric Ovens, non Self-Cleaning (CCEs in ¢/kWh)											
	0	Baseline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1	1	0 + Reduced Vent Rate	2.7	2.7	2.7	N/A	N/A	N/A	N/A	N/A	N/A
2	2	1 + Improved Insulation	4.3	4.3	4.3	N/A	N/A	N/A	N/A	N/A	N/A
3	3	2 + Improved Seals	9.6	9.6	9.6	N/A	N/A	N/A	N/A	N/A	N/A
Gas Cooktops (CCEs in \$/MMBtu)											
1,2	0	Baseline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	1	0 + Electronic Ignition	1.1	1.1	1.1	5.1	5.1	5.1	1.9	1.9	1.9
Gas Ovens, non Self-Cleaning (CCEs in \$/MMBtu)											
1,2	0	Baseline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	1	0 + Electric Glo-bar Ignition	1.4	1.4	1.4	7.0	7.0	7.0	2.5	2.5	2.5
Gas Ranges											
1,2	0	Baseline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3a	1 + 1	0 + Glo-bar(Oven) / Electronic(Cktop)	1.3	1.3	1.3	3.6	3.6	3.6	1.7	1.7	1.7
3b	1 + 8	0 + Both Electronic (Oven & Cktop)	0.9	0.9	0.9	3.2	3.2	3.2	1.4	1.4	1.4



**Supplemental Table 4.42a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Electric Ovens, non Self-Cleaning: 1995 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Elec. Use kWh/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Elec. Use kWh/yr	PTP Operating Cost (1990\$/yr)
	0	399.08	274.94	21.25	636.14	100.0%	325.97	25.19
1	1	402.55	263.23	20.34	629.51	0.0%	311.78	24.09
2	2	410.08	251.78	19.46	627.17	0.0%	297.91	23.02
3	3	427.83	247.96	19.16	641.62	0.0%	293.28	22.66

**Supplemental Table 4.42b**  
Weighted Average of Units Sold Below Standard Levels  
Electric Ovens, non Self-Cleaning: 1995 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	399.08	399.08	399.08
Annual Operating Cost (1990 \$)			
Field usage	21.25	21.25	21.25
Proposed Test Proc.	25.19	25.19	25.19
Life-Cycle Cost at 6% (1990 \$)	636.14	636.14	636.14
Energy Use (kWh/yr)	274.94	274.94	274.94

**Supplemental Table 4.42c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Electric Ovens, non Self-Cleaning: 1995 AEO Fuel Prices

Standard Level	1	2	3
LCC Difference	6.6	9.0	-5.5
Payback (year)			
Field usage	3.8	6.1	13.8
PTP	3.2	5.1	11.4
CCE (cent/kWh)	2.7	4.3	9.6

**Supplemental Table 4.43a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Electric Ovens, non Self-Cleaning: 1997 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Elec. Use kWh/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Elec. Use kWh/yr	PTP Operating Cost (1990\$/yr)
	0	399.08	274.94	20.22	624.65	100.0%	325.97	23.97
1	1	402.55	263.23	19.35	618.51	0.0%	311.78	22.92
2	2	410.08	251.78	18.51	616.65	0.0%	297.91	21.90
3	3	427.83	247.96	18.23	631.26	0.0%	293.28	21.56

**Supplemental Table 4.43b**  
Weighted Average of Units Sold Below Standard Levels  
Electric Ovens, non Self-Cleaning: 1997 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	399.08	399.08	399.08
Annual Operating Cost (1990 \$)			
Field usage	20.22	20.22	20.22
Proposed Test Proc.	23.97	23.97	23.97
Life-Cycle Cost at 6% (1990 \$)	624.65	624.65	624.65
Energy Use (kWh/yr)	274.94	274.94	274.94

**Supplemental Table 4.43c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Electric Ovens, non Self-Cleaning: 1997 AEO Fuel Prices

Standard Level	1	2	3
LCC Difference	6.1	8.0	-6.6
Payback (year)			
Field usage	4.0	6.5	14.5
PTP	3.3	5.3	12.0
CCE (cent/kWh)	2.7	4.3	9.6

**Supplemental Table 4.44a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Electric Ovens, non Self-Cleaning: 1997 GRI Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Elec. Use kWh/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Elec. Use kWh/yr	PTP Operating Cost (1990\$/yr)
	0	399.08	274.94	18.93	610.29	100.0%	325.97	22.44
1	1	402.55	263.23	18.12	604.77	0.0%	311.78	21.47
2	2	410.08	251.78	17.33	603.50	0.0%	297.91	20.51
3	3	427.83	247.96	17.07	618.32	0.0%	293.28	20.19

**Supplemental Table 4.44b**  
Weighted Average of Units Sold Below Standard Levels  
Electric Ovens, non Self-Cleaning: 1997 GRI Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	399.08	399.08	399.08
Annual Operating Cost (1990 \$)			
Field usage	18.93	18.93	18.93
Proposed Test Proc.	22.44	22.44	22.44
Life-Cycle Cost at 6% (1990 \$)	610.29	610.29	610.29
Energy Use (kWh/yr)	274.94	274.94	274.94

**Supplemental Table 4.44c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Electric Ovens, non Self-Cleaning: 1997 GRI Fuel Prices

Standard Level	1	2	3
LCC Difference	5.5	6.8	-8.0
Payback (year)			
Field usage	4.3	6.9	15.5
PTP	3.6	5.7	12.8
CCE (cent/kWh)	2.7	4.3	9.6

**Supplemental Table 4.45a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Cooktops: Installation Cost = \$0, 1995 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	218.80	3.37	20.46	447.11	17.3%	3.89	23.62
3	1	244.76	1.32	15.26	415.08	82.7%	1.84	18.42

**Supplemental Table 4.45b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Cooktops: Installation Cost = \$0, 1995 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	218.80
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	20.46
Proposed Test Proc.	N/A	N/A	23.62
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	447.11
Energy Use (MMBtu/yr)	N/A	N/A	3.37

**Supplemental Table 4.45c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Electric Ovens, non Self-Cleaning: 1997 GRI Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	32.0
Payback (years)			
Field usage	N/A	N/A	5.0
Proposed Test Proc.	N/A	N/A	5.0
CCE (\$/MMBtu)	N/A	N/A	1.1

**Supplemental Table 4.46a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Cooktops: Installation Cost = \$0, 1997 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	218.80	3.37	17.96	419.15	17.3%	3.89	20.73
3	1	244.76	1.32	14.28	404.13	82.7%	1.84	17.05

**Supplemental Table 4.46b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Cooktops: Installation Cost = \$0, 1997 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	218.80
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	17.96
Proposed Test Proc.	N/A	N/A	20.73
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	419.15
Energy Use (MMBtu/yr)	N/A	N/A	3.37

**Supplemental Table 4.46c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Cooktops: Installation Cost = \$0, 1997 AEO Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	15.0
Payback (years)			
Field usage	N/A	N/A	7.1
Proposed Test Proc.	N/A	N/A	7.1
CCE (\$/MMBtu)	N/A	N/A	1.1

**Supplemental Table 4.47a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Cooktops: Installation Cost = \$0, 1997 GRI Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	218.80	3.37	19.05	431.38	17.3%	3.89	21.99
3	1	244.76	1.32	14.71	408.92	82.7%	1.84	17.65

**Supplemental Table 4.47b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Cooktops: Installation Cost = \$0, 1997 GRI Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	218.80
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	19.05
Proposed Test Proc.	N/A	N/A	21.99
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	431.38
Energy Use (MMBtu/yr)	N/A	N/A	3.37

**Supplemental Table 4.47c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Cooktops: Installation Cost = \$0, 1997 GRI Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	22.5
Payback (years)			
Field usage	N/A	N/A	6.0
Proposed Test Proc.	N/A	N/A	6.0
CCE (\$/MMBtu)	N/A	N/A	1.1

**Supplemental Table 4.48a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Cooktops: Installation Cost = \$90, 1995 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	218.80	3.37	20.46	447.11	17.3%	3.89	23.62
3	1	334.76	1.32	15.26	505.08	82.7%	1.84	18.42

**Supplemental Table 4.48b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Cooktops: Installation Cost = \$90, 1995 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	218.80
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	20.46
Proposed Test Proc.	N/A	N/A	23.62
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	447.11
Energy Use (MMBtu/yr)	N/A	N/A	3.37

**Supplemental Table 4.48c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Cooktops: Installation Cost = \$90, 1995 AEO Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	-58.0
Payback (years)			
Field usage	N/A	N/A	22.3
Proposed Test Proc.	N/A	N/A	22.3
CCE (\$/MMBtu)	N/A	N/A	5.1

**Supplemental Table 4.49a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Cooktops: Installation Cost = \$90, 1997 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	218.80	3.37	17.96	419.15	17.3%	3.89	20.73
3	1	334.76	1.32	14.28	494.13	82.7%	1.84	17.05

**Supplemental Table 4.49b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Cooktops: Installation Cost = \$90, 1997 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	218.80
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	17.96
Proposed Test Proc.	N/A	N/A	20.73
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	419.15
Energy Use (MMBtu/yr)	N/A	N/A	3.37

**Supplemental Table 4.49c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Cooktops: Installation Cost = \$90, 1997 AEO Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	-75.0
Payback (years)			
Field usage	N/A	N/A	31.6
Proposed Test Proc.	N/A	N/A	31.6
CCE (\$/MMBtu)	N/A	N/A	5.1



**Supplemental Table 4.50a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Cooktops: Installation Cost = \$90, 1997 GRI Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	218.80	3.37	19.05	431.38	17.3%	3.89	21.99
3	1	334.76	1.32	14.71	498.92	82.7%	1.84	17.65

**Supplemental Table 4.50b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Cooktops: Installation Cost = \$90, 1997 GRI Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	218.80
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	19.05
Proposed Test Proc.	N/A	N/A	21.99
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	431.38
Energy Use (MMBtu/yr)	N/A	N/A	3.37

**Supplemental Table 4.50c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Cooktops: Installation Cost = \$90, 1997 GRI Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	-67.5
Payback (years)			
Field usage	N/A	N/A	26.7
Proposed Test Proc.	N/A	N/A	26.7
CCE (\$/MMBtu)	N/A	N/A	5.1

**Supplemental Table 4.51a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Cooktops: Installation Cost = \$18, 1995 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	218.80	3.37	20.46	447.11	17.3%	3.89	23.62
3	1	262.76	1.32	15.26	433.08	82.7%	1.84	18.42

**Supplemental Table 4.51b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Cooktops: Installation Cost = \$18, 1995 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	218.80
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	20.46
Proposed Test Proc.	N/A	N/A	23.62
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	447.11
Energy Use (MMBtu/yr)	N/A	N/A	3.37

**Supplemental Table 4.51c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Cooktops: Installation Cost = \$18, 1995 AEO Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	14.0
Payback (years)			
Field usage	N/A	N/A	8.5
Proposed Test Proc.	N/A	N/A	8.5
CCE (\$/MMBtu)	N/A	N/A	1.9

**Supplemental Table 4.52a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Cooktops: Installation Cost = \$18, 1997 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	218.80	3.37	17.96	419.15	17.3%	3.89	20.73
3	1	262.76	1.32	14.28	422.13	82.7%	1.84	17.05

**Supplemental Table 4.52b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Cooktops: Installation Cost = \$18, 1997 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	218.80
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	17.96
Proposed Test Proc.	N/A	N/A	20.73
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	419.15
Energy Use (MMBtu/yr)	N/A	N/A	3.37

**Supplemental Table 4.52c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Cooktops: Installation Cost = \$18, 1997 AEO Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	-3.0
Payback (years)			
Field usage	N/A	N/A	12.0
Proposed Test Proc.	N/A	N/A	12.0
CCE (\$/MMBtu)	N/A	N/A	1.9

**Supplemental Table 4.53a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Cooktops: Installation Cost = \$18, 1997 GRI Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	218.80	3.37	19.05	431.38	17.3%	3.89	21.99
3	1	262.76	1.32	14.71	426.92	82.7%	1.84	17.65

**Supplemental Table 4.53b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Cooktops: Installation Cost = \$18, 1997 GRI Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	218.80
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	19.05
Proposed Test Proc.	N/A	N/A	21.99
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	431.38
Energy Use (MMBtu/yr)	N/A	N/A	3.37

**Supplemental Table 4.53c** Life-Cycle Cost Difference (1990\$), Payback Periods (years) and Costs of Conserved Energy (@6%)  
Gas Cooktops: Installation Cost = \$18, 1997 GRI Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	4.5
Payback (years)			
Field usage	N/A	N/A	10.1
Proposed Test Proc.	N/A	N/A	10.1
CCE (\$/MMBtu)	N/A	N/A	1.9

**Supplemental Table 4.54a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ovens, non Self-Cleaning: Installation Cost = \$0, 1995 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	479.49	2.98	18.09	681.38	30.7%	3.58	21.74
3	1	502.80	1.52	11.20	627.78	69.3%	2.13	15.70

**Supplemental Table 4.54b**

Weighted Average of Units Sold Below Standard Levels  
Gas Ovens, non Self-Cleaning: Installation Cost = \$0, 1995 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	479.49
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	18.09
Proposed Test Proc.	N/A	N/A	21.74
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	681.38
Energy Use (MMBtu/yr)	N/A	N/A	2.98

**Supplemental Table 4.54c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)

Gas Ovens, non Self-Cleaning: Installation Cost = \$0, 1995 AEO Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	53.6
Payback (years)			
Field usage	N/A	N/A	3.4
Proposed Test Proc.	N/A	N/A	3.9
CCE (\$/MMBtu)	N/A	N/A	1.4

**Supplemental Table 4.55a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ovens, non Self-Cleaning: Installation Cost = \$0, 1997 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	479.49	2.98	15.88	656.65	30.7%	3.58	19.07
3	1	502.80	1.52	10.02	614.65	69.3%	2.13	14.05

**Supplemental Table 4.55b**

Weighted Average of Units Sold Below Standard Levels  
Gas Ovens, non Self-Cleaning: Installation Cost = \$0, 1997 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	479.49
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	15.88
Proposed Test Proc.	N/A	N/A	19.07
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	656.65
Energy Use (MMBtu/yr)	N/A	N/A	2.98

**Supplemental Table 4.55c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)

Gas Ovens, non Self-Cleaning: Installation Cost = \$0, 1997 AEO Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	42.0
Payback (years)			
Field usage	N/A	N/A	4.0
Proposed Test Proc.	N/A	N/A	4.6
CCE (\$/MMBtu)	N/A	N/A	1.4

**Supplemental Table 4.56a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ovens, non Self-Cleaning: Installation Cost = \$0, 1997 GRI Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	479.49	2.98	16.85	667.47	30.7%	3.58	20.24
3	1	502.80	1.52	10.32	617.98	69.3%	2.13	14.47

**Supplemental Table 4.56b**

Weighted Average of Units Sold Below Standard Levels  
Gas Ovens, non Self-Cleaning: Installation Cost = \$0, 1997 GRI Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	479.49
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	16.85
Proposed Test Proc.	N/A	N/A	20.24
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	667.47
Energy Use (MMBtu/yr)	N/A	N/A	2.98

**Supplemental Table 4.56c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)

Gas Ovens, non Self-Cleaning: Installation Cost = \$0, 1997 GRI Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	49.5
Payback (years)			
Field usage	N/A	N/A	3.6
Proposed Test Proc.	N/A	N/A	4.0
CCE (\$/MMBtu)	N/A	N/A	1.4

**Supplemental Table 4.57a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ovens, non Self-Cleaning: Installation Cost = \$90, 1995 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	479.49	2.98	18.09	681.38	30.7%	3.58	21.74
3	1	592.80	1.52	11.20	717.78	69.3%	2.13	15.70

**Supplemental Table 4.57b**

Weighted Average of Units Sold Below Standard Levels  
Gas Ovens, non Self-Cleaning: Installation Cost = \$90, 1995 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	479.49
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	18.09
Proposed Test Proc.	N/A	N/A	21.74
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	681.38
Energy Use (MMBtu/yr)	N/A	N/A	2.98

**Supplemental Table 4.57c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)

Gas Ovens, non Self-Cleaning: Installation Cost = \$90, 1995 AEO Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	-36.4
Payback (years)			
Field usage	N/A	N/A	16.4
Proposed Test Proc.	N/A	N/A	18.8
CCE (\$/MMBtu)	N/A	N/A	7.0



**Supplemental Table 4.58a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ovens, non Self-Cleaning: Installation Cost = \$90, 1997 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	479.49	2.98	15.88	656.65	30.7%	3.58	19.07
3	1	592.80	1.52	10.02	704.65	69.3%	2.13	14.05

**Supplemental Table 4.58b**

Weighted Average of Units Sold Below Standard Levels  
Gas Ovens, non Self-Cleaning: Installation Cost = \$90, 1997 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	479.49
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	15.88
Proposed Test Proc.	N/A	N/A	19.07
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	656.65
Energy Use (MMBtu/yr)	N/A	N/A	2.98

**Supplemental Table 4.58c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)

Gas Ovens, non Self-Cleaning: Installation Cost = \$90, 1997 AEO Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	-48.0
Payback (years)			
Field usage	N/A	N/A	19.4
Proposed Test Proc.	N/A	N/A	22.5
CCE (\$/MMBtu)	N/A	N/A	7.0

**Supplemental Table 4.59a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ovens, non Self-Cleaning: Installation Cost = \$90, 1997 GRI Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	479.49	2.98	16.85	667.47	30.7%	3.58	20.24
3	1	592.80	1.52	10.32	707.98	69.3%	2.13	14.47

**Supplemental Table 4.59b**

Weighted Average of Units Sold Below Standard Levels

Gas Ovens, non Self-Cleaning: Installation Cost = \$90, 1997 GRI Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	479.49
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	16.85
Proposed Test Proc.	N/A	N/A	20.24
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	667.47
Energy Use (MMBtu/yr)	N/A	N/A	2.98

**Supplemental Table 4.59c** Life-Cycle Cost Difference (1990\$), Payback

Periods (years) and Costs of Conserved Energy (@6%)

Gas Ovens, non Self-Cleaning: Installation Cost = \$90, 1997 GRI Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	-40.5
Payback (years)			
Field usage	N/A	N/A	17.4
Proposed Test Proc.	N/A	N/A	19.6
CCE (\$/MMBtu)	N/A	N/A	7.0

**Supplemental Table 4.60a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ovens, non Self-Cleaning: Installation Cost = \$18, 1995 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	479.49	2.98	18.09	681.38	30.7%	3.58	21.74
3	1	520.80	1.52	11.20	645.78	69.3%	2.13	15.70

**Supplemental Table 4.60b**

Weighted Average of Units Sold Below Standard Levels  
Gas Ovens, non Self-Cleaning: Installation Cost = \$18, 1995 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	479.49
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	18.09
Proposed Test Proc.	N/A	N/A	21.74
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	681.38
Energy Use (MMBtu/yr)	N/A	N/A	2.98

**Supplemental Table 4.60c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)

Gas Ovens, non Self-Cleaning: Installation Cost = \$18, 1995 AEO Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	35.6
Payback (years)			
Field usage	N/A	N/A	6.0
Proposed Test Proc.	N/A	N/A	6.8
CCE (\$/MMBtu)	N/A	N/A	2.5

**Supplemental Table 4.61a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ovens, non Self-Cleaning: Installation Cost = \$18, 1997 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	479.49	2.98	15.88	656.65	30.7%	3.58	19.07
3	1	520.80	1.52	10.02	632.65	69.3%	2.13	14.05

**Supplemental Table 4.61b**

Weighted Average of Units Sold Below Standard Levels  
Gas Ovens, non Self-Cleaning: Installation Cost = \$18, 1997 AEO Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	479.49
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	15.88
Proposed Test Proc.	N/A	N/A	19.07
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	656.65
Energy Use (MMBtu/yr)	N/A	N/A	2.98

**Supplemental Table 4.61c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)

Gas Ovens, non Self-Cleaning: Installation Cost = \$18, 1997 AEO Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	24.0
Payback (years)			
Field usage	N/A	N/A	7.1
Proposed Test Proc.	N/A	N/A	8.2
CCE (\$/MMBtu)	N/A	N/A	2.5

**Supplemental Table 4.62a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ovens, non Self-Cleaning: Installation Cost = \$18, 1997 GRI Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	479.49	2.98	16.85	667.47	30.7%	3.58	20.24
3	1	520.80	1.52	10.32	635.98	69.3%	2.13	14.47

**Supplemental Table 4.62b**

Weighted Average of Units Sold Below Standard Levels

Gas Ovens, non Self-Cleaning: Installation Cost = \$18, 1997 GRI Fuel Prices

Standard Level	1	2	3
Installed Consumer Cost (1990 \$)	N/A	N/A	479.49
Annual Operating Cost (1990 \$)			
Field usage	N/A	N/A	16.85
Proposed Test Proc.	N/A	N/A	20.24
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	667.47
Energy Use (MMBtu/yr)	N/A	N/A	2.98

**Supplemental Table 4.62c** Life-Cycle Cost Difference (1990\$), Payback

Periods (years) and Costs of Conserved Energy (@6%)

Gas Ovens, non Self-Cleaning: Installation Cost = \$18, 1997 GRI Fuel Prices

Standard Level	1	2	3
LCC Difference	N/A	N/A	31.5
Payback (years)			
Field usage	N/A	N/A	6.3
Proposed Test Proc.	N/A	N/A	7.2
CCE (\$/MMBtu)	N/A	N/A	2.5

**Supplemental Table 4.63a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ranges: Installation Cost = \$0, 1995 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	698.29	6.35	38.58	1128.80	19.1%	7.47	45.34
3a	1 + 1	747.56	2.85	26.47	1042.92	40.5%	3.97	34.05
3b	1 + 8	734.96	2.85	24.54	1008.76	40.5%	3.97	31.35

**Supplemental Table 4.63b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Ranges: Installation Cost = \$0, 1995 AEO Fuel Prices

Standard Level	1	2	3a	3b
Installed Consumer Cost (1990 \$)	N/A	N/A	698.29	698.29
Annual Operating Cost (1990 \$)				
Field usage	N/A	N/A	38.58	38.58
Proposed Test Proc.	N/A	N/A	45.34	45.34
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	1128.80	1128.80
Energy Use (MMBtu/yr)	N/A	N/A	6.35	6.35

**Supplemental Table 4.63c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Ranges: Installation Cost = \$0, 1995 AEO Fuel Prices

Standard Level	1	2	3a	3b
LCC Difference	N/A	N/A	85.9	120.0
Payback (years)				
Field usage	N/A	N/A	4.1	2.6
Proposed Test Proc.	N/A	N/A	4.4	2.6
CCE (\$/MMBtu)	N/A	N/A	1.3	0.9

**Supplemental Table 4.64a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ranges: Installation Cost = \$0, 1997 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	698.29	6.35	33.86	1076.07	19.1%	7.47	39.78
3a	1 + 1	747.56	2.85	24.31	1018.83	40.5%	3.97	31.04
3b	1 + 8	734.96	2.85	22.42	985.13	40.5%	3.97	28.40

**Supplemental Table 4.64b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Ranges: Installation Cost = \$0, 1997 AEO Fuel Prices

Standard Level	1	2	3a	3b
Installed Consumer Cost (1990 \$)	N/A	N/A	698.29	698.29
Annual Operating Cost (1990 \$)				
Field usage	N/A	N/A	33.86	33.86
Proposed Test Proc.	N/A	N/A	39.78	39.78
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	1076.07	1076.07
Energy Use (MMBtu/yr)	N/A	N/A	6.35	6.35

**Supplemental Table 4.64c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Ranges: Installation Cost = \$0, 1997 AEO Fuel Prices

Standard Level	1	2	3a	3b
LCC Difference	N/A	N/A	57.2	90.9
Payback (years)				
Field usage	N/A	N/A	5.2	3.2
Proposed Test Proc.	N/A	N/A	5.6	3.2
CCE (\$/MMBtu)	N/A	N/A	1.3	0.9

**Supplemental Table 4.65a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ranges: Installation Cost = \$0, 1997 GRI Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	698.29	6.35	35.92	1099.13	19.1%	7.47	42.21
3a	1 + 1	747.56	2.85	25.04	1026.95	40.5%	3.97	32.06
3b	1 + 8	734.96	2.85	23.35	995.46	40.5%	3.97	29.69

**Supplemental Table 4.65b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Ranges: Installation Cost = \$0, 1997 GRI Fuel Prices

Standard Level	1	2	3a	3b
Installed Consumer Cost (1990 \$)	N/A	N/A	698.29	698.29
Annual Operating Cost (1990 \$)				
Field usage	N/A	N/A	35.92	35.92
Proposed Test Proc.	N/A	N/A	42.21	42.21
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	1099.13	1099.13
Energy Use (MMBtu/yr)	N/A	N/A	6.35	6.35

**Supplemental Table 4.65c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Ranges: Installation Cost = \$0, 1997 GRI Fuel Prices

Standard Level	1	2	3a	3b
LCC Difference	N/A	N/A	72.2	103.7
Payback (years)				
Field usage	N/A	N/A	4.5	2.9
Proposed Test Proc.	N/A	N/A	4.9	2.9
CCE (\$/MMBtu)	N/A	N/A	1.3	0.9



**Supplemental Table 4.66a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ranges: Installation Cost = \$90, 1995 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	698.29	6.35	38.58	1128.80	19.1%	7.47	45.34
3a	1 + 1	837.56	2.85	26.47	1132.92	40.5%	3.97	34.05
3b	1 + 8	824.96	2.85	24.54	1098.76	40.5%	3.97	31.35

**Supplemental Table 4.66b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Ranges: Installation Cost = \$90, 1995 AEO Fuel Prices

Standard Level	1	2	3a	3b
Installed Consumer Cost (1990 \$)	N/A	N/A	698.29	698.29
Annual Operating Cost (1990 \$)				
Field usage	N/A	N/A	38.58	38.58
Proposed Test Proc.	N/A	N/A	45.34	45.34
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	1128.80	1128.80
Energy Use (MMBtu/yr)	N/A	N/A	6.35	6.35

**Supplemental Table 4.66c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Ranges: Installation Cost = \$90, 1995 AEO Fuel Prices

Standard Level	1	2	3a	3b
LCC Difference	N/A	N/A	-4.1	30.0
Payback (years)				
Field usage	N/A	N/A	11.5	9.0
Proposed Test Proc.	N/A	N/A	12.3	9.1
CCE (\$/MMBtu)	N/A	N/A	3.6	3.2

**Supplemental Table 4.67a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ranges: Installation Cost = \$90, 1997 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	698.29	6.35	33.86	1076.07	19.1%	7.47	39.78
3a	1 + 1	837.56	2.85	24.31	1108.83	40.5%	3.97	31.04
3b	1 + 8	824.96	2.85	22.42	1075.13	40.5%	3.97	28.40

**Supplemental Table 4.67b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Ranges: Installation Cost = \$90, 1997 AEO Fuel Prices

Standard Level	1	2	3a	3b
Installed Consumer Cost (1990 \$)	N/A	N/A	698.29	698.29
Annual Operating Cost (1990 \$)				
Field usage	N/A	N/A	33.86	33.86
Proposed Test Proc.	N/A	N/A	39.78	39.78
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	1076.07	1076.07
Energy Use (MMBtu/yr)	N/A	N/A	6.35	6.35

**Supplemental Table 4.67c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Ranges: Installation Cost = \$90, 1997 AEO Fuel Prices

Standard Level	1	2	3a	3b
LCC Difference	N/A	N/A	-32.8	0.9
Payback (years)				
Field usage	N/A	N/A	14.6	11.1
Proposed Test Proc.	N/A	N/A	15.9	11.1
CCE (\$/MMBtu)	N/A	N/A	3.6	3.2

**Supplemental Table 4.68a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ranges: Installation Cost = \$90, 1997 GRI Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	698.29	6.35	35.92	1099.13	19.1%	7.47	42.21
3a	1 + 1	837.56	2.85	25.04	1116.95	40.5%	3.97	32.06
3b	1 + 8	824.96	2.85	23.35	1085.46	40.5%	3.97	29.69

**Supplemental Table 4.68b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Ranges: Installation Cost = \$90, 1997 GRI Fuel Prices

Standard Level	1	2	3a	3b
Installed Consumer Cost (1990 \$)	N/A	N/A	698.29	698.29
Annual Operating Cost (1990 \$)				
Field usage	N/A	N/A	35.92	35.92
Proposed Test Proc.	N/A	N/A	42.21	42.21
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	1099.13	1099.13
Energy Use (MMBtu/yr)	N/A	N/A	6.35	6.35

**Supplemental Table 4.68c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Ranges: Installation Cost = \$90, 1997 GRI Fuel Prices

Standard Level	1	2	3a	3b
LCC Difference	N/A	N/A	-17.8	13.7
Payback (years)				
Field usage	N/A	N/A	12.8	10.1
Proposed Test Proc.	N/A	N/A	13.7	10.1
CCE (\$/MMBtu)	N/A	N/A	3.6	3.2

**Supplemental Table 4.69a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ranges: Installation Cost = \$18, 1995 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	698.29	6.35	38.58	1128.80	19.1%	7.47	45.34
3a	1 + 1	765.56	2.85	26.47	1060.92	40.5%	3.97	34.05
3b	1 + 8	752.96	2.85	24.54	1026.76	40.5%	3.97	31.35

**Supplemental Table 4.69b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Ranges: Installation Cost = \$18, 1995 AEO Fuel Prices

Standard Level	1	2	3a	3b
Installed Consumer Cost (1990 \$)	N/A	N/A	698.29	698.29
Annual Operating Cost (1990 \$)				
Field usage	N/A	N/A	38.58	38.58
Proposed Test Proc.	N/A	N/A	45.34	45.34
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	1128.80	1128.80
Energy Use (MMBtu/yr)	N/A	N/A	6.35	6.35

**Supplemental Table 4.69c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Ranges: Installation Cost = \$18, 1995 AEO Fuel Prices

Standard Level	1	2	3a	3b
LCC Difference	N/A	N/A	67.9	102.0
Payback (years)				
Field usage	N/A	N/A	5.6	3.9
Proposed Test Proc.	N/A	N/A	6.0	3.9
CCE (\$/MMBtu)	N/A	N/A	1.7	1.4

**Supplemental Table 4.70a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ranges: Installation Cost = \$18, 1997 AEO Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	698.29	6.35	33.86	1076.07	19.1%	7.47	39.78
3a	1 + 1	765.56	2.85	24.31	1036.83	40.5%	3.97	31.04
3b	1 + 8	752.96	2.85	22.42	1003.13	40.5%	3.97	28.40

**Supplemental Table 4.70b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Ranges: Installation Cost = \$18, 1997 AEO Fuel Prices

Standard Level	1	2	3a	3b
Installed Consumer Cost (1990 \$)	N/A	N/A	698.29	698.29
Annual Operating Cost (1990 \$)				
Field usage	N/A	N/A	33.86	33.86
Proposed Test Proc.	N/A	N/A	39.78	39.78
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	1076.07	1076.07
Energy Use (MMBtu/yr)	N/A	N/A	6.35	6.35

**Supplemental Table 4.70c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Ranges: Installation Cost = \$18, 1997 AEO Fuel Prices

Standard Level	1	2	3a	3b
LCC Difference	N/A	N/A	39.2	72.9
Payback (years)				
Field usage	N/A	N/A	7.0	4.8
Proposed Test Proc.	N/A	N/A	7.7	4.8
CCE (\$/MMBtu)	N/A	N/A	1.7	1.4

**Supplemental Table 4.71a** Cost (1990\$) and Energy-Use (Field Usage and Proposed Test Procedure)  
Gas Ranges: Installation Cost = \$18, 1997 GRI Fuel Prices

Standard Level	Design No.	Installed Consumer Cost (1990\$)	Field Gas & Elec Use MMBtu/yr	Field Operating Cost (1990\$/yr)	Life-Cycle Cost (1990\$)	2001 Distribution	PTP Gas & Elec Use MMBtu/yr	PTP Operating Cost (1990\$/yr)
1,2	0	698.29	6.35	35.92	1099.13	19.1%	7.47	42.21
3a	1 + 1	765.56	2.85	25.04	1044.95	40.5%	3.97	32.06
3b	1 + 8	752.96	2.85	23.35	1013.46	40.5%	3.97	29.69

**Supplemental Table 4.71b**  
Weighted Average of Units Sold Below Standard Levels  
Gas Ranges: Installation Cost = \$18, 1997 GRI Fuel Prices

Standard Level	1	2	3a	3b
Installed Consumer Cost (1990 \$)	N/A	N/A	698.29	698.29
Annual Operating Cost (1990 \$)				
Field usage	N/A	N/A	35.92	35.92
Proposed Test Proc.	N/A	N/A	42.21	42.21
Life-Cycle Cost at 6% (1990 \$)	N/A	N/A	1099.13	1099.13
Energy Use (MMBtu/yr)	N/A	N/A	6.35	6.35

**Supplemental Table 4.71c** Life-Cycle Cost Difference (1990\$), Payback  
Periods (years) and Costs of Conserved Energy (@6%)  
Gas Ranges: Installation Cost = \$18, 1997 GRI Fuel Prices

Standard Level	1	2	3a	3b
LCC Difference	N/A	N/A	54.2	85.7
Payback (years)				
Field usage	N/A	N/A	6.2	4.3
Proposed Test Proc.	N/A	N/A	6.6	4.4
CCE (\$/MMBtu)	N/A	N/A	1.7	1.4